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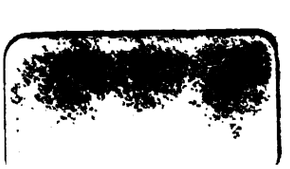

UNIVERSAL
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DECORATOR

BODLEIANA · BIBLIOTHECA

THE

UNIVERSAL DECORATOR.

EDITED BY

FRANCIS BENJAMIN THOMPSON.

ILLUSTRATED BY

WILLIAM GIBBS.

"There is, perhaps, no art exercising a larger influence over the advancement of civilization, than that of the Decorator."

SAMUEL JOHNSON.

VOLUME THE THIRD.

LONDON:

GEORGE VICKERS.

MDCCCLIX.

SUMFIELD AND JONES, PRINTERS, WEST HARDING STREET, FETTER LANE.

PANEL (ITALIAN).

Universal Decorator.

Decorative Materials.

We have the whole evidence of antiquity to prove that the most abundant natural materials were those most freely used for adornment and decoration. The colossal pillars and statues of the Egyptians were carved from the stores of inexhaustible quarries; and the delicate marble in which the Greeks produced all but breathing images, was as common in Peloponnesia as coals at Newcastle. Jewels, as such, are merely articles of intrinsic value: they have no interest in the artistic eye: when cut and polished they are specimens of mechanical skill—nothing more. But the less valued metal which forms their setting, is an object of a thousand times greater regard. On this human talents have been expended. In any estimate of decorative art, the principal consideration is adaptability. Were it possible to rear a gigantic statue of crystal, the effect would not equal that of a similar structure of bronze or adamant: the first would be a toy—the second a work of art. And it is to create a distinction between such toys and works of art, that we wish to direct our readers' attention to the tendency exhibited during the past few years to *over-apply* every novel material of brick, stone, metal, or glass. With the latter material we are indeed sated. Its architectural application has completely ruined architectural style; and, with silly pertinacity, we observe men striving their utmost to substitute glare and glitter for substantiality. Now, architectural effect can never be produced with glass. Its transparency destroys those salient lines which mark the exquisite proportions of the heathen temple. At the distance surveyed from which the Parthenon reveals all the glories of art, the Crystal Palace looks only like a monstrous iceberg. The beauty of the Parthenon is seen at a glance: the proportions of the Crystal Palace require the application of theodolites and measuring tapes. The house called "Beautiful" can never be formed of glass. Look, again, at the material called parian. There is a beautiful substance for the reproduction of statuary; but our manufacturers are not contented with that, its legitimate use—they must needs mould it into domestic utensils, for which it is wholly unfitted. What has a more disgusting appearance than a stained parian butter pot or milk pot, for instance? yet no material is more susceptible to stains. Then, these articles are very usually adorned with subjects in high relief, impossible to clean, and, if broken, equally impossible to repair. It has been truly observed of that nondescript, the British public, that it is always fascinated by alto relievo; and this gives a clue to the rationale of that remarkable fact, that English furniture can never be cleaned.

Without decrying manufacture, which produces by exact method material adapted to the utensils of necessity and luxury, may we not consider how far our native mineral and vegetable wealth has been explored with advantage, in order to derive from a natural source that abundance of material which has now to be produced artificially. It is only a few years since that somebody sliced one of those miniature boulders that lie kicking about the roads, and found that the surface, when polished, rivalled that of the rarest cameo stone of antiquity. So, the Scotch pebble came into note, and now it forms one of the most important articles of jewellery. What is the Bristol diamond or Paris paste to this exquisite natural production? It must not be thought that we are in any way antagonistic to manufacture; we wish to see it at work in the right direction—that is, at work on sound solid material, instead of the trashy compositions which flutter the vitiated taste of the public with meretricious and evanescent gaud. Would it not be better for the workman to have more remunerative employment? Would it not be more creditable to the master to deal in genuine articles than trash—works of art than toys?

Within a single twelvemonth, were the decorative manufacturers of England unanimous, a substitution of real for spurious material might be made, without affecting the cost of production, which would render our household ornaments, our trinkets, and other articles of virtù, at least equal in quality to those of antiquity. But it is the pertinacity with which old trade formulæ are abided by that is the clog in the wheel of progress.

There is bog oak, than which no ebony is more splendid. Its use is confined to neckchains, workboxes, and such like trifles. Could it not be excavated in sufficient quantity to form substantial furniture?

What we want is a thorough exploration of the resources of our islands in this respect; and we earnestly recommend this task to private hands. There is none of us who might not in some way become a discoverer of material, if we only kept our eyes open and our wits at work.

Grammar of Chymistry.

FOR THE USE OF ARTISTS AND ARTISANS.

By FRANCIS BENJAMIN THOMPSON.

CHAPTER V. (*continued*).—INORGANIC ELEMENTS AND THEIR COMBINATIONS.

Iodine (symbol I, equivalent 127·082, sp. gr. 4·948). The name of this substance is derived from the Greek Ιώδης, meaning violet coloured. It is solid and opaque, and possesses a semi-metallic lustre. It melts at 227° F., and is converted into vapour at 350°. It requires 7,000 parts of water for its solution. It is a powerful bleacher. Iodine is frequently adulterated with water, black lead, and crude sulphuret of antimony. The tests for iodine are—its purple vapour, and an intense blue coloured precipitate, which is produced when added to a solution of starch in cold water. Hot water is useless.* Starch paper, prepared like the litmus and turmeric, is useful for this purpose. It is said that one part of iodine in 450 of water may be detected in this manner.

It is obtained from kelp, or seaweed, by dissolving its ashes in water. The products are carbonate of soda and iodine, the latter forming a small residuum at the bottom of the vessel in the shape of hydriodic acid. After removing the carbonate of soda, the residuum is placed in a retort and receiver, and sulphuric acid poured upon it. Immediately the violet vapour becomes visible. This condenses in crystalline plates, which are collected and dried.

Iodine was first employed as a photographic agent in 1829 by MM. Daguerre and Neipce, they using it "to blacken the plate which contained the heliographic impression."

Both iodine and its various combinations are now most extensively used in the calotype process. It is employed in distinct forms in daguerreotype and photography. In the first process it is used dry, "the vapour having a tendency, even at the common temperature of the air, to assume the gaseous state; and as it combines in that state with the metals, upon simple contact with them, it is an easy task to generate on the polished silver plate the coat of iodide of silver requisite for the production of a picture on it. The simplest way of reducing iodine to a state of minute division for the above purpose, is to dissolve it in alcohol, precipitate it again with water, filter off the liquid, and dry the pulverulent particles."

Iodide of potassium is the other form of its application. This important salt is thus prepared, according to M. Frederking:—30oz. of iodine are heated in a cast iron cauldron with 15lbs. of rain water; and gradually 15oz., or, indeed, so much iron filings added until the liquor has become clear. The decanted liquor, together with the wash water, is mixed in a bottle with 10oz. of iodine; and in this manner a solution of protoperiodide of iron is obtained. Upon this so much solution of carbonate of potassa is added to it in a spacious vessel until a filtered sample scarcely exhibits the presence of iron. A small portion of the iodide of ferium is left undecomposed. The precipitate of protoperoxide of ferium is dried in the vessel after removal of the liquor, that it may be more easily washed. The liquid is evaporated in an iron cauldron to dryness, and then melted in it, to destroy any iodide of ferium that it may still contain. The salt is then dissolved in 8lbs. of distilled water, the solution filtered, and the iodide of potassium evaporated slowly to crystallisation in a porcelain basin. Beautiful large crystals are obtained.

(*To be continued.*)

* According to Sir Humphry Davy, one of the best tests of the presence of a very minute quantity of iodine in compounds is their action upon silver. Water, when it contains less than $\frac{1}{1000}$ part of its weight of the double or triple alkaline compounds of iodine, tarnishes polished silver.

Architectural Glossary.

(*Continued from Vol. II., page* 71.)

BEAD. A moulding on the upper edge of a skirting board, on the lining board of a door case, and on the inner or lower edge of an architrave. Sometimes a bead plain is set on upon the edge of each fascia of an architrave, and not unfrequently (especially in the Corinthian and Composite orders) this moulding is cut or carved in short embossments, resembling common beads in semi-relief. The astragal is often carved thus.

BOULTIN. A convex moulding, consisting of exactly a quarter of a circle. It is the member next below the plinth in the Tuscan and Doric capitals.

CAMERATED (Latin, *cameratus*), arched. Cantalivre, a kind of modilion which is carved. Cantalivres are set like cartouches, at equal distances under the corona of the cornices of buildings.

CAPITAL. The top of a column, generally forming an ornament.

CARTRIDGE. A cartouche.

CARYATIDES. An order of pillars in the form of the bodies of women, with their arms amputated. The figures are draped to the feet.

CAULICOLI. The carved scrolls under the abacus of the Corinthian capital.

CAVETTO, or CASEMENT. A hollow moulding of from one-sixth to one-fourth of a circle.

CHAPITER, or CHAPTER. The capital of a column.

COLUMN. A pillar used for support and ornament.

CONGES. The rings or ferules used on the extremities of wooden pillars, to prevent their splitting. Afterwards imitated in stone work.

CORBEL. A shouldering piece, or jutting out in walls, to bear up a post, &c. Also a niche in the wall of a church, or other edifice, in which an image is placed.

CORBEL STONES. Smooth or polished stones laid in the front and outside of corbels or niches.

CORNICE. The third and highest part of the entablature. The term also commonly signifies the uppermost ornament of a wainscot.

CORONA. The flat and most advanced part of the cornice, called the drip or eaves.

(*To be continued.*)

CORRESPONDENCE.—"G. L. K."—We cannot accede to your request. Such an object would render our pages ridiculous. You must compose for yourself: we have supplied plenty of ornament that might be adapted to the purpose. If the drawings are meritorious, we will accept them with thanks.——"W. M. M."—There is no difficulty in etching on German silver. The description of acid to be employed depends on the quality of the metal.

Technicologia.

175. *Clays.*—All kinds of pottery are in general made of clays or argillaceous earths, because these earths are capable of being kneaded, and easily receiving any form, and of acquiring much solidity and hardness by exposure to fire. But clays differ much in the effects produced upon them by fire. Some clays which are of the purest kind resist the most violent fire without receiving any other change than a considerable hardness; but still they are not rendered so hard and compact as other clays. A second kind of clays by exposure to violent heat acquires a hardness equal to that of flints, and a texture compact and glossy, like that of good porcelain; but they are nevertheless infusible by the most violent heat. These qualities are occasioned by some fusible materials being mixed with them, as sand, chalk, gypsum, or ferruginous earth, which are in too small a quantity to effect a complete, but only a beginning or partial fusion. Lastly, a third kind of clays is first hardened by fire, and afterward completely fused. This last kind of clays evidently contains the largest quantity of the fusible matters above mentioned.

From the properties of these three principal clays it may be concluded, that from clays alone three principal kinds of pottery may be produced. With the first kind of clay, pots or crucibles may be formed capable of sustaining the most violent fire without fusion, of containing melted metals, and even hard glasses not too fluid; but which, from want of sufficient compactness, are incapable of containing during a long time in fusion very fusible substances, such as nitre, glass of lead, glasses containing much arsenic, &c., by which substances their pores are pervaded. These clays are employed advantageously for the formation of large pots or crucibles used in glass-houses for containing hard glass, as bottle-glass.

With clays of the second kind may be made crucibles and other potteries, commonly called stone ware. Potteries made with these earths, when sufficiently baked, are very sonorous, so hard as to strike fire with steel, capable of containing all liquids, of which the former kind, from their porosity, are incapable, and even resist the action of nitre, glass of lead, and other fluxes, when the earth of which they are formed is of good quality; but their hardness and density, which prevent their sudden expansion and contraction, by the hasty application of heat and cold, make them liable to break in all operations where they are suddenly exposed to heat or to cold, as for instance, in a furnace through which a strong current of air passes. If this kind of pottery had not this inconvenience, it would be the best and most perfect for the purposes of ordinary life and chymistry. Notwithstanding this inconvenience, it is the only pottery that is applicable on many occasions; but then all possible care must be taken to prevent its breaking, by a very gradual application of heat and cold, and by protecting it from currents of cold air.

With the fusible clays may be made many kinds of vessels, which are cheap, as they require little fire to bake them; for all this kind of pottery is but slightly baked; whence its texture is coarse and porous. Some utensils are made of this pottery without glazing; but in general they are covered with a glazing, without which, water or other liquids would pass through their pores. Some of this pottery, which is finished with more care, is covered with a white enamel, which makes it very neat and like porcelain. This is called delft ware. Other coarser potteries of this kind are glazed with glass of lead mixed with metallic oxides, or fusible coloured earths; from which they receive various colours. This is the ordinary pottery.

A fine kind of pottery is made of white clays, or of such as whiten in the fire, the surface of which is vitrified by throwing into the furnace, when the ware is sufficiently baked, some common salt and saltpetre. This pottery is called English ware on the Continent, because the first and best was made in England. It is white, fine, well baked, and has some small degree of transparency when thin; so that it is intermediate betwixt porcelain and common stone ware, and may therefore be called a semiporcelain.

Tobacco-pipe clay from Dorsetshire is beaten much in water: by this process, the finer parts of the clay remain suspended in the water, while the coarser sand and other impurities fall to the bottom. The thick liquid, consisting of water and the finer parts of the clay, is further purified by passing it through hair and lawn sieves of different degrees of fineness. After this, the liquid is mixed (in various proportions for various wares) with another liquor, of as nearly as may be the same density, and consisting of flints calcined, ground, and suspended in water. The mixture is then dried in a kiln; and being afterward beaten to a proper temper, it becomes fit for being formed at the wheel into dishes, plates, bowls, &c. When this ware is to be put into the furnace to be baked, the several pieces of it are placed in the cases made of clay, called seggars, which are piled one upon another, in the dome of the furnace: a fire is then lighted; and when the ware is brought to a proper temper, which happens in about forty-eight hours, it is glazed by common salt. The salt is thrown into the furnace, through holes in the upper part of it, by the heat of which it is instantly converted into a thick vapour; which, circulating through the furnace, enters the seggar through holes made in its side (the top being covered, to prevent the salt from falling on the ware), and attaching itself to the surface of the ware, it forms that vitreous coat upon the surface which is called its glaze.

This curious method of glazing earthenware by the vapour of common salt was introduced into England by two Dutchmen, near a century and a half ago. It appears to be produced by a combination of the alkali with the siliceous earth or sand of the clay.

The yellow or Queen's ware is made of the same materials as the flint ware; but the proportion in which the materials are mixed is not the same, nor is the ware glazed in the same way. The flint ware is generally made of four measures of liquid flint, and of eighteen of liquid clay; the yellow ware has a greater proportion of clay in it; in some manufactories they mix twenty, and in others twenty-four measures of clay with four of flint. These proportions, if estimated by the weight of the materials, would probably give for the flint ware about three cwt. of clay to one cwt. of flint, and for the yellow ware somewhat more clay. The proportion, however, for both sorts of ware depends very much upon the nature of the clay, which is very variable even in the same pit. Hence a previous trial must be made of the quality of the clay, by burning a kiln of the ware. If there be too much flint mixed with the clay, the ware, when exposed to the air after burning, is apt to crack;

and if there be too little, the ware will not receive the proper glaze, from the circulation of the salt vapour.

This glaze, even when it is most perfect, is in appearance less beautiful than the glaze on the yellow ware.

The yellow glaze is made by mixing together in water, till it becomes as thick as cream, 112lb. of white lead, 24lb. of ground flint, and 6lb. of ground flint glass. Some manufacturers leave out the glass, and mix only 80lb. of white lead with 20lb. of ground flint; and others doubtless observe different rules, of which it is very difficult to obtain an account.

The ware before it is glazed is baked in the fire. By this means it acquires the property of strongly imbibing moisture. It is therefore dipped in the liquid glaze, and suddenly taken out: the glaze is imbibed into its pores, and the ware presently becomes dry. It is then exposed a second time to the fire, by which means the glaze it has imbibed is melted, and a thin glassy coat is formed upon its surface. The colour of this coat is more or less yellow, according as a greater or less proportion of lead has been used. The lead is principally instrumental in producing the glaze, as well as in giving it the yellow colour; for lead, of all the substances hitherto known, has the greatest power of promoting the vitrification of the substances with which it is mixed. The flint serves to give a consistence to the lead during the time of its vitrification, and to hinder it from becoming too fluid, and running down the sides of the ware, and thereby leaving them unglazed.

This yellowish colour which lead gives when vitrified with flints may be wholly changed by very small additions of other mineral substances. Thus, to give one instance, the beautiful black glaze, which is fixed on one sort of the ware made at Nottingham, is composed of twenty-one parts, by weight, of white lead, of five of powdered flints, and of three of manganese. The Queen's ware at present made is much whiter than formerly.

The coarse stone ware made at Bristol consists of tobacco-pipe clay and sand, and is glazed by the vapour of salt, like Staffordshire flint ware; but it is far inferior to it in beauty.

Chaptal tried various methods to glaze pottery without lead, and two among them succeeded well enough in his opinion to justify his publishing them. The first consists in mixing the earth of Murviel, which appears to be a fusible or compound clay, in water, and dipping the pottery therein; this done, it is suffered to dry; after which it is plunged into a second water, in which levigated green glass is mixed. This covering of vitreous powder fuses with the clay of Murviel, and the result is very smooth, very white, and very cheap glazing.

The second method consists in immersing the dried pottery into a strong solution of sea salt, and afterward baking it. The trial which Chaptal made in his furnaces gave him reason to expect, that this method might be used in large works.

He likewise obtained a very black glazing by exposing pottery strongly heated to the fumes of sea coal. He coated several vessels in this manner by throwing a large quantity of coal in powder into a furnace, wherein the pottery was ignited to whiteness. The effect, he informs us, is still more complete, when the chimneys or tubes of aspiration of the furnace are at that moment closed, and kept so for some minutes.

The residuum left after distilling oxygenised hydrochloric acid, ground with sand, would make a good dark-bronze-coloured glaze, free from the noxious qualities imputable to lead.

A writer in Sonnini's Bibliothèque Physico-Economique observes, that it is of some importance in domestic economy, to be able to judge of the goodness of an article in such extensive use as earthenware, with regard to the goodness and innoxiousness of its coating.

The glaze of earthenware may have several defects: it may be scratched more or less readily by a hard body; weak acids, such as vinegar, lemon-juice, verjuice, &c., may attack and dissolve the lead it contains: or oily substances standing long on it may produce the same effect, stain it, and render it dull.

To determine its power of resisting friction, it may be rubbed with sand; and if this scratch it more readily, than it does a glaze known to be good, we may be assured it is soft.

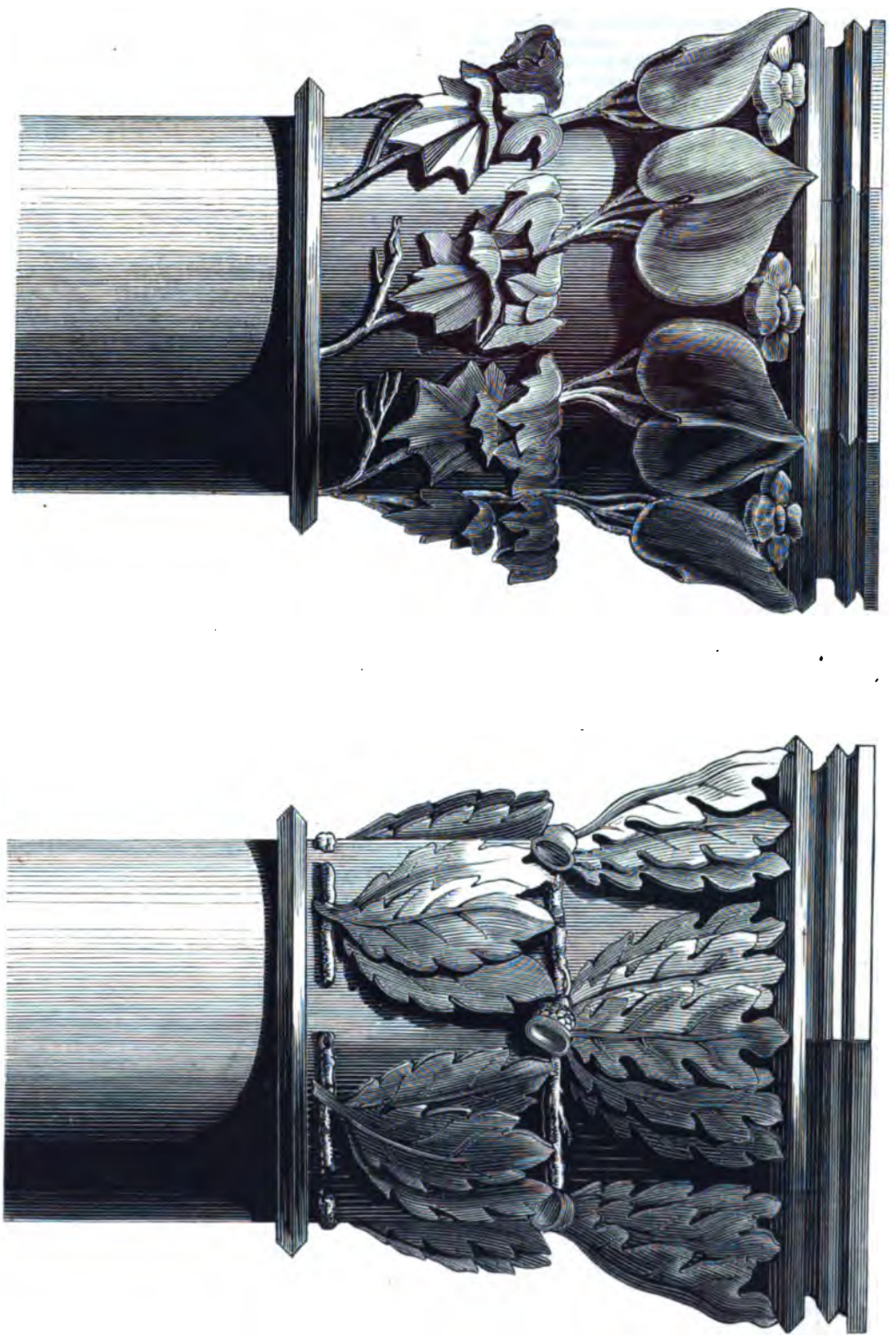
If vinegar be boiled for some hours in a vessel coated with a soft glaze, it will attack the glaze, and dissolve a portion of its lead, which will be precipitated from the vinegar on the addition of a few drops of sulphuric acid, commonly called oil of vitriol.

But a method more within everyone's reach, and therefore deserving to be known, is, to let fall a drop of strong ink on a piece of earthenware, dry it before the fire, and then wash it. If the glaze be too soft, the ink will leave on it a slight spot.

NEW PATTERNS.

The love of novelty, strong in most human beings, is the source of great pleasure, and a considerable motive power in generating improvement. But it may have its disadvantages, and it is quite possible that, fostered by circumstances unduly, it may be pushed to an unhealthy extreme. We believe that this is the case in all kinds of manufactures at the present time. There is a morbid craving in the public mind for novelty as *mere novelty*, without regard to intrinsic goodness; and all manufacturers, in the present mischievous race for competition, are driven to pander to it. It is not sufficient that each manufacturer produces a few patterns of the best sort every season, they must be generated by the score and by the hundreds. One of our first potters brought to town upwards of a thousand patterns! There are upwards of six thousand patterns for calico-printing registered annually, and this we estimate to be only a third of the number produced. In the spasmodic effort to obtain novelty all kinds of absurdities are committed. The manufacturer in *solid* forms turns ornamental heads into tails and tails into heads, and makes the most incongruous combinations of parts. The manufacturer of fabrics ornamented on the surface cannot be content with harmonious blendings of colour, but is compelled to be most *uncomplimentary* in his colouring. One of the best cotton-printers told us that the creation of new patterns was an endless stream. The very instant his hundred new patterns were out he began to engrave others. His designers were worked like mill-horses. We are most decidedly of opinion that this course is generally detrimental to the advance of ornamental design, to the growth of public taste, and to the commercial interests of the manufacturer and designer.

BOSSES OR KNOTS (GOTHIC).



CAPITALS (GOTHIC).

Criticism in Relation to the Fine Arts.

By Wilhelm Schadow.

ALL criticism, in my opinion, should spring from a sentiment of good-will, from a love of truth, from a desire of conducting to perfection the talent upon which it is exercised. In order to arrive at the delivery of an enlightened judgment upon a picture, a judgment which confirms first impressions by a profound and rational analysis, the following are the steps which, from my own experience, appear to be the surest.

In every work of Art really worthy of that title is discovered a *thought*, which in the artist's mind has already before its execution been clad in a picturesque form; this principle is equally applicable to subjects of a high order, and to those of an inferior class. I may even say, that in a simple copy from nature it will be easy to detect, if to the power of imagining, the artist has added the art of appropriating, the characteristic physiognomy of the object imitated. Whoever is endowed with a poetic soul will know how to give to a single portrait a more animated expression than he who has only studied the *materiality* of Art. We meet with portraits in which, as in a biography, we seem to read all the events which have left impressions on the minds of those who are represented. The *thought*, then, will be the first thing to which a true critic will direct his chief attention. He will first examine if the thought which the artist has conceived be that which would naturally arise from the subject represented—if the manner in which he has expounded it has rendered that thought clear to the spectator—if, in fact, he has known how to lay hold of that which is characteristic of the actors in the scene represented in his work.

The practised eye of a connoisseur will know how to recognise, in spite of faults of execution, the merit of the conception; and it is thus he will discover talent in an artist, even before the artist himself has been able to acquire and master the knowledge and practice necessary to give beautiful forms to the objects which he has been able to conceive. I repeat, then, that what should, before all, fix the attention of the critic, is a due appreciation of the original idea. To develope this idea—that is to say, to give it a form, by the help of which it is made visible—such is the aim of the painter in employing form and colour.

Now, since in painting colour cannot exist without form, it is quite natural to examine the style of the forms by means of which the idea is expressed. Let, then, the critic notice if everything is natural in the action of the figures represented, and if all their parts be combined in true proportions. But to be able to deliver a well-founded opinion, it is necessary to be thoroughly acquainted with the laws of proportion; these are more especially to be seen in a high degree of perfection in the works of the ancients: it is necessary to possess a thorough knowledge of anatomy and perspective, added to the practice of seeing, and judging those great works of Art, recognised to be such by artists of mature experience—matters which unfortunately are little thought of by those who proclaim their opinions, or rather impose them on the public.

Colour demands a still larger and more laborious course of study. The study of the phenomena of light, as well in nature as in the great works of Art, can only be pursued with complete success when the man who gives himself up to it is endowed with a visual organ of sufficient delicacy; and this gift is not so common as many an incompetent critic may think.

In regard to execution, we find that many people attach great importance to what they call "freedom of touch." Doubtless, it is not to be denied that there is a great charm attached to a work in which the spontaneous idea of the artist is perceived in his freedom and facility; but it must not be forgotten that true facility of execution can only result from a profound knowledge of the subject treated, and over which a thorough mastery has been acquired. There are artists of immortal celebrity whose works have no claim to this freedom, and this modest reserve on their part may perhaps be attributed to the very earnestness with which they have studied nature; since, little satisfied with themselves, they preferred to investigate further and further still, and shewed in this as much application as would have done credit to mere students. Such efforts in great masters are always evidence of a noble and conscientious delicacy. I have no hesitation in declaring that such minds, while their physical powers are true to them, so far from producing a succession of inferior works, are always in a state of progress.

The advantages which result from facility of execution depend greatly upon contingencies; and, as far as my own opinion goes, I attach little value to it, unless as the result of profound knowledge.

After having shewn how an inquiring mind forms its judgment by slow degrees, and shuns with equal care that false enthusiasm which too easily springs up in minds of a generous and impressible character, and that cold reasoning which receives no impression at all, far be it from me to advise him who examines a picture to proceed at first so methodically, for every work of Art should be examined in the same spirit it is conceived in. The artist brings to his work all the energies of his soul, therefore take you care in your judgment to distinguish between imagination, sentiment, and thought,—all these powers are in equal force here. This is especially to be seen in classical compositions. Let, then, the critic remain passive, and leave himself to be acted upon by the work before him; let him then consider it attentively, so that the very spirit of the work may speak to him in his own language; and even as the artist in the expression of the idea has intrusted to reason the care of scrutinising, of weighing, and of rejecting the materials to be employed, so the true connoisseur, making use also of his reason, should examine and weigh the impressions he first receives, to the end that he may separate the false from the true.

Those who are born with a true genius for criticism (and it is those only who should be permitted to deliver their judgments to the public) are generally correct in their first impressions; but when it becomes necessary to give a reason for their belief, and to communicate their impressions to others, they must have recourse to mental labour, and the method such as I have pointed out seems to me to lead most surely to the desired end.

Thus a superficial, ill-natured, and personal critic appears to me despicable, to the same extent that I esteem a judicious and even severe one, provided that

the severity arises from a love of truth. It is proved by experience that we cannot always judge soundly of the productions of one's own mind; it is proper, then, to abstain from regarding with mockery and ill-will the works of those artists who exhibit a true love of Art and an earnest desire to improve themselves. Sarcasm and irony should be exercised, then, only against self-conceit, even though joined to great powers; in such a case only can irony be useful: for self-esteem, advancing in a false direction, can the more easily deceive and seduce itself the more it is accompanied by talent. Since the production of a work of Art, of whatever class, demands the conjunction and activity of the highest faculties with which the Creator has endowed the soul of man—a feeling of imagination and of thought—and since the domain of the Artist is altogether ideal and boundless, it is kindness and love, not irony and sarcasm, that should await upon the efforts of those who have entered on so noble a calling.

Architectural Glossary.

(*Continued from page* 2.)

DADO. The die, which is the part in the middle of the pedestal of a column which is between its base and cornice.

DENTIL. A member of the cornice in some of the orders. In the Tuscan order it is formed by the spaces left betwixt the niches cut out at certain distances on the underside of the corona, resembling a row of teeth. In the Doric, Ionic, and Corinthian orders (without the pedestal) they stand under the corona.

DIASTYLE. An edifice, the pillars of which are placed at the distance of three of their diameters from one another.

DOME (*domus*, Latin). A vaulted roof.

DROPS. Ornaments to the pillars of the Doric order, underneath the triglyphs, representing little bells.

ECHINUS. A member or ornament placed on the top of the Ionic capital.

EGG AND ANCHOR. This moulding ornament resembles the objects from which the names are derived. It is commonly part of the enrichment of the boultins of capitals of the Tuscan, Doric, and Ionic orders.

ENTABLATURE. The architrave, frieze, and cornice.

EYE. The middle of an Ionic volute, cut in the form of a rose.

FACE. Any member that has a great breadth, and but small projection, as the architrave in front of a building.

FASCIA. A broad list or fillet in architraves, and in the cornices of pedestals. "Three bands of which the architrave is composed."—*Bailey*.

FLUTES. The hollows made in the body of a column. The Doric, Ionic, Corinthian, and Composite are commonly fluted. Each column has 24 flutes, and the concavity of each flute is exactly a quarter of a circle. In the Doric column the flutes join together without any interspace; but in the Ionic, Corinthian, and Composite columns there runs a list between every two flutes.

FOLIAGE. Work wrought in bunches and leaves.

FRET. A fillet, or system of fillets, generally at right angles to each other. When the fillets resemble battlements, the ornament is called an embattled fret.

FRIEZE. The round part of the entablature which is between the architrave and the cornice.

(*To be continued.*)

The Royal Crown.

The Crown of her present Majesty was made by Messrs. Rundell and Bridge. It is composed of hoops of silver, which are completely covered and concealed by precious stones, surmounted by a ball covered with small diamonds, having a Maltese cross of diamonds on the top of it. In the centre of this cross is a magnificent sapphire. In front of the crown, above the rim, is another Maltese cross, in the middle of which is the large unpolished ruby which once graced the coronet of the chivalrous Black Prince; and underneath this, in the circular rim, is another immense sapphire. The arches inclose a cap of deep purple, or rather blue velvet; and the rim of the crown, at its base, is clustered with brilliants, and ornamented with fleurs-de-lis and Maltese crosses equally rich. There are many other precious gems—emeralds and rubies, sapphires, and small clusters of drop pearls of great value. The following estimate of the value of the different jewels contained in this magnificent diadem has been published.

Twenty diamonds round the circle, £1,500 each...	£30,000
Two large centre diamonds, £2,000 each ...	4000
Fifty-four smaller diamonds placed at the angle of the former	100
Four crosses, each composed of twenty-five diamonds	12,000
Four large diamonds on the tops of the crosses...	40,000
Twelve diamonds contained in fleurs-de-lis ...	10,000
Eighteen smaller diamonds contained in the same	2,000
Pearls, diamonds, &c., on the arches and crosses	10,000
Also one hundred and forty-one diamonds ...	500
Twenty-six diamonds on the upper cross ...	3,000
Two circles of pearls about the rim	300
	£111,900

We know not upon what data this statement was made; but it will be observed, the value of the sapphires and rubies has not been included—and we have reason to believe, that were it possible to re-collect and again bring together such precious gems, the estimate just given would fall much below their intrinsic value. The old crown made for George III. weighed upwards of seven pounds; but, notwithstanding this gorgeous display of jewellery, independent of the gold cap, the present crown only weighs nineteen ounces and ten pennyweights. It measures seven inches in height from the gold circle to the upper cross; and its diameter at the rim is five inches.

This crown is worn by her Majesty whenever she opens and closes in person the Houses of Parliament.

Dryers in Oil Painting.

BY M. E. CHEVREUL.

Oil paint, such as is used for house-painting, consists essentially of three substances, without including the colouring material, or pigment:—

1. Of a *white;* either white lead, or ceruse (carbonate of oxide of lead), or zinc white (oxide of zinc).

2. Of *an oily liquid;* either linseed oil or poppy oil, which (the latter in France especially) is employed to reduce the white lead or zinc to a soft paste; to this paste are afterwards added variable proportions of linseed oil and spirits of turpentine.

3. Of a substance called DRYER, which is linseed oil boiled either with litharge (oxide of lead) or with oxide of manganese; or of linseed oil mixed with litharge in powder, for the first coats and dark colours. Sometimes we use, instead of litharge, sugar of lead (acetate of lead) ground in oil, but only for light and delicate colours.

The paint, by the addition of the *dryer*, acquires the property of drying quicker than it does without it, and it is considered indispensable by house-painters, in every instance where they apply a coat of paint to wood, stone, metal, &c., that it should become quite dry within forty-eight, or at most seventy-two hours after its application.

The following experiments shew that paint *dries* by absorbing oxygen (from the atmosphere), so that a board of painted oak wood dries more quickly in a vessel filled with oxygen gas than it would have done in atmospheric air; these experiments also prove that it would have dried very little during the same period of time in a vessel filled with carbonic acid gas.

The following comparative details of the experiments leave no room for doubting the statement I have made:—

At one p.m. on 17th Nov. I painted four pieces of oak wood.
- One side with white lead ground in pure linseed oil.
- The other side with zinc white ground in the same.

One piece was left in the open air (No. 1).

One piece was placed in a glass vessel, of a capacity of about half a gallon, which was carefully closed (No. 2).

One piece was put into another glass vessel of the same size, from which the atmospheric air was expelled by means of a current of oxygen gas; it was then filled with dry oxygen gas (No. 3).

One piece was placed in a glass vessel of the same size as the above, from which the atmospheric air was expelled by a current of carbonic acid gas; it was then filled with dry carbonic acid gas (No. 4).

		On the 18th Nov., at one p.m., after 24 hours.	On the 20th Nov., at one p.m. after 72 hours.
In the open air. No. 1.	The white lead was almost dry	Perfectly dry.	
	The zinc white was set, but not dry ..	Perfectly dry.	
In confined air. No. 2.	The white lead was almost dry	Perfectly dry.	
	The zinc white was set, but not dry ..	Perfectly dry.	
In oxygen gas. No. 3.	The white lead was quite dry.		
	The zinc white was quite dry.		
In carbonic acid gas. No. 4.	The white lead	Almost set, but not adhering to the wood.	
	The zinc white	Absolutely wet.	

It was remarked that after twenty-four hours the zinc white, which was not dry in the air, was perfectly dry in oxygen gas; and that the white lead and zinc white Nos. 1, 2, and 3, which were perfectly dry after seventy-two hours, adhered strongly to the wood, while the white lead No. 4 came entirely off when rubbed with the finger, and that the zinc white stuck to the fingers like fresh paint.

The experiments now related shew we can keep oil paint for a long time under water without its drying, if it remains at rest, and the pellicle which is formed on the surface of the submerged paint is not broken.

We observe that the expression of *drying* is improper, for it signifies that a moist substance loses the liquid portion by evaporation; paint, far from *losing* anything, absorbs oxygen, and *gains* in weight.

Other things being equal, paint dries more quickly in a temperature of 25° to 28°, than in one of 15° or 18°.

This explains how, in practice, the proportion of *dryer* varies with the temperature. Thus, in winter we add to the linseed oil with which the white lead is mixed, from 3 to 9 and even 10 per cent. of dryer, while in summer it is limited to ½, 1½, or 2 per cent., if not entirely omitted, particularly in the last coat.

Technicologia.

176. *Oil.*—The distinctive characters of oil are inflammability, insolubility in water, and fluidity, at least in a moderate temperature. Oils are distinguished into fixed or fat oils, which do not rise in distillation at the temperature of boiling water; and volatile or essential oils, which do rise at that temperature.

Fixed oils are obtained by pressure, sometimes assisted by heat, or by boiling in water, from the emulsive seeds or kernels of vegetables; and likewise from the fatty parts of animals. They are generally fluid in the temperature of the atmosphere, but some of them have a considerable degree of firmness or solidity. They have a very smooth feel; require a degree of heat much superior to that of boiling water, to cause them to rise in ebullition; and cannot be set on fire, unless heated to this degree. The use of the wick of a lamp consists in bringing small portions of oil to its extremity, by the capillary attraction; where they become successively volatilised and inflamed. Oils are remarkably less sonorous than water, when poured out. Fat oils, not being at all dissipated by the heat of the atmosphere, make a permanent greasy spot, when they fall on porous substances.

These oils are decomposed by distillation, and afford a small quantity of water loaded with a peculiar acid, a light oil, a dense oil, hydrogen, and carbonic acid gas. The residue consists of a small quantity of charcoal.

Fat oils, by exposure to the air, become rancid, and exhibit a disengaged acid, which may be washed off by water. When they are exposed to the air, in a thin coat, upon the surface of water, they become more consistent, like wax, by absorbing the oxygen of the atmosphere. The oxygenised hydrochloric acid produces this change more speedily. Agitation in water, particularly if acidulated, separates a mucilage from them. They combine with barytes, strontia, magnesia, and lime, which convert them into saponaceous compounds. With the pure alkalies they form common soap. They do not unite with ammonia, but by long trituration.

The mineral acids unite with fat oils, and form compounds, or imperfect soaps. Fuming nitrous acid causes them to take fire, as has already been observed. Sulphur is soluble in fat oils, by a digesting heat; and is gradually deposited in part from them, in a crystalline form, by cooling.

Fixed oils seem not to be susceptible of combination with pure metallic substances, excepting iron and copper, upon which they act in a sufficiently distinct manner. But they combine with metallic oxides, and form with them thick concrete combinations, of a soapy appearance, as is observable in the preparation of unguents and plasters. These preparations have not yet been chemically examined. Metallic oxides are likewise boiled in oils to give them the quality of drying quickly.

Mr. Sheldrake has observed, that oils thus prepared dry by forming a superficial skin, and the more of this quality they possess, the more colours mixed with them are liable to change by keeping. He therefore recommends, to dissolve amber, or copal, in the oil, which will cause the oil to dry by uniform inspissation; and with this to mix the colours previously ground in oil of turpentine.

Mr. Vanherman laid before the Society of Arts a method of rendering fish-oil applicable to painting; and it appears to make a good and cheap vehicle for colours exposed to the weather, though it dries but slowly. To thirty-two gallons of vinegar he adds 12lbs. of litharge and 12lbs. of sulphate of zinc, shaking the mixture well twice a day for a week. The mixture is then put into a tun of fish-oil, with which it is well shaken and mixed; and the next day the clearer part, about $\frac{3}{4}$ of the whole, is poured off. Twelve gallons of linseed oil, and two of oil of turpentine, are then added to the clear part; and this, being well shaken together, is left to settle for two or three days, when it will be fit to grind white lead and all fine colours in. These, however, are to be thinned for use with linseed oil and oil of turpentine.

For cheap paints exposed to the weather, whiting and road dirt finely sifted are to be mixed with limewater to the consistence of mortar; to this may be added almost any pigment ground with the sediment of the prepared oil, in the proportion of one part to two of the limewater already used; and the whole is to be thinned for use by adding to every eight pounds a quart of linseed oil, and as much of a mixture of the prepared oil with limewater. The proportions of this mixture are not mentioned.

If two ounces of litharge be added to a gallon of linseed oil, and well shaken every day for a fortnight; and the clear part, mixed with half a pint of oil of turpentine, be exposed to the sun for three days in shallow pans, Mr. Vanherman informs us, it will be as white as nut-oil. If half a pound of frankincense be dissolved in a quart of oil of turpentine, and added to a gallon of this bleached oil; and white lead, ground in oil of turpentine, be thinned for use with this mixture, he asserts that it will be quite dry and void of smell in four hours.

It is likewise desirable to purify the coarse fish oils for the purposes of burning, and of some manufactures. This may be effected to a certain degree by shaking it with limewater, or with a little chalk and slaked lime and water. But to purify it thoroughly an ounce of powdered chalk, a quarter of an ounce of lime slaked in the air, and half a pint of water, should be well mixed with a gallon of the stinking oil; and when it has stood some hours, a pint of water and two ounces of pearl ashes should be added, and the mixture kept simmering over the fire till the oil appears of a light amber colour: then add an ounce of salt dissolved in half a pint of water, boil half an hour longer, and let the mixture stand till the oil separates. If it be required still purer, the oil after being poured off may be treated in a nearly similar manner, but without heat, with an ounce of chalk, a quarter of an ounce of pearl ashes, and half an ounce of salt. If an oil of somewhat more consistence be wanted, kitchen stuff may be added to it while it continues hot.

In the assaying of metals, fixed oils are sometimes employed to reduce the metallic oxides. Berthollet has given an ingenious and simple process for effecting instantaneously a real combination between fixed oil and any metallic oxide, that is, for preparing a metallic soap. It consists in pouring a metallic solution into a solution of common soap. The acid of the metallic solution combines with the fixed alkali of the soap; and the metallic oxide is then precipitated in union with the oil, to which it communicates a colour. In this manner soap of a beautiful green colour may be prepared with sulphate of copper; and with sulphate of iron, a clear deep brown soap. Fourcroy thinks these compounds might be very useful in painting.

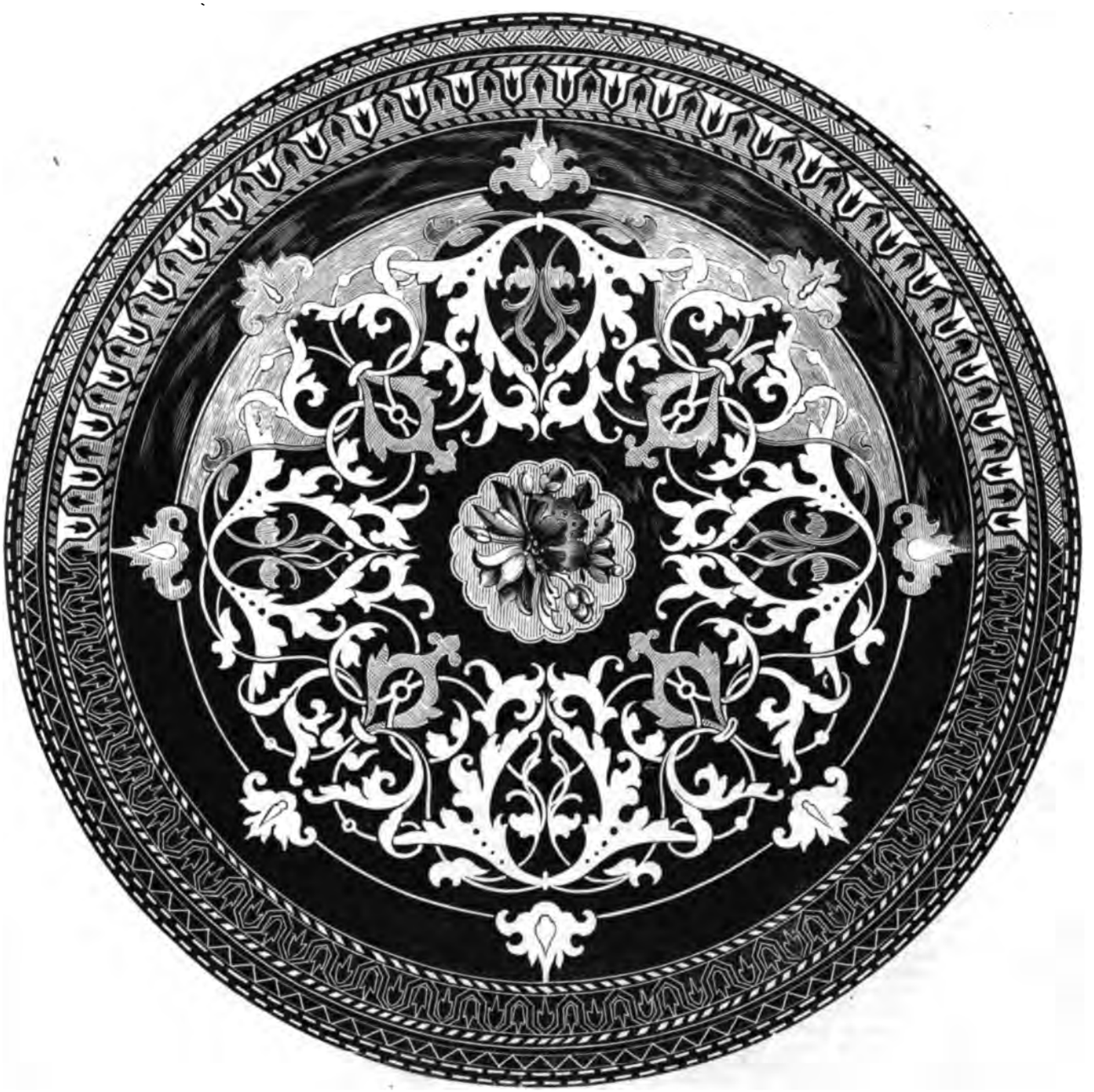
ART AND WEALTH.

Whilst the *commercial* value of ornamental design now comes home practically to the perception of tens of thousands—to manufacturers, artists, and designers; to artisans and dealers in decorative manufactures; the *moral* influence of ornamental art extends to millions. Striking illustrations of this commercial value constantly present themselves. A designer, pointing to a drawing, observed to us lately, "That magnolia has been worth eighty pounds to me." Not long ago, it was the current talk in the mercers' shops that the Cobdens of Manchester had made more than ten thousand pounds' profit by a certain printed pattern. The ornamental bread-platter suggested by Bell, the sculptor, has positively originated a trade in that article, not only in Sheffield, but all over the country. A potter once directed our attention to a particular pattern, printed on earthenware, in the printing alone of which he said eight persons had been employed incessantly for seven years. More proofs of a fact now so universally admitted, that successful ornamental design is a source of wealth to *all* parties concerned in its production, cannot be necessary. And surely the stale proverb of a thousand years' standing, that art softens rough natures, need hardly be quoted in proof of its moral benefits.

ART IN ATHENS.

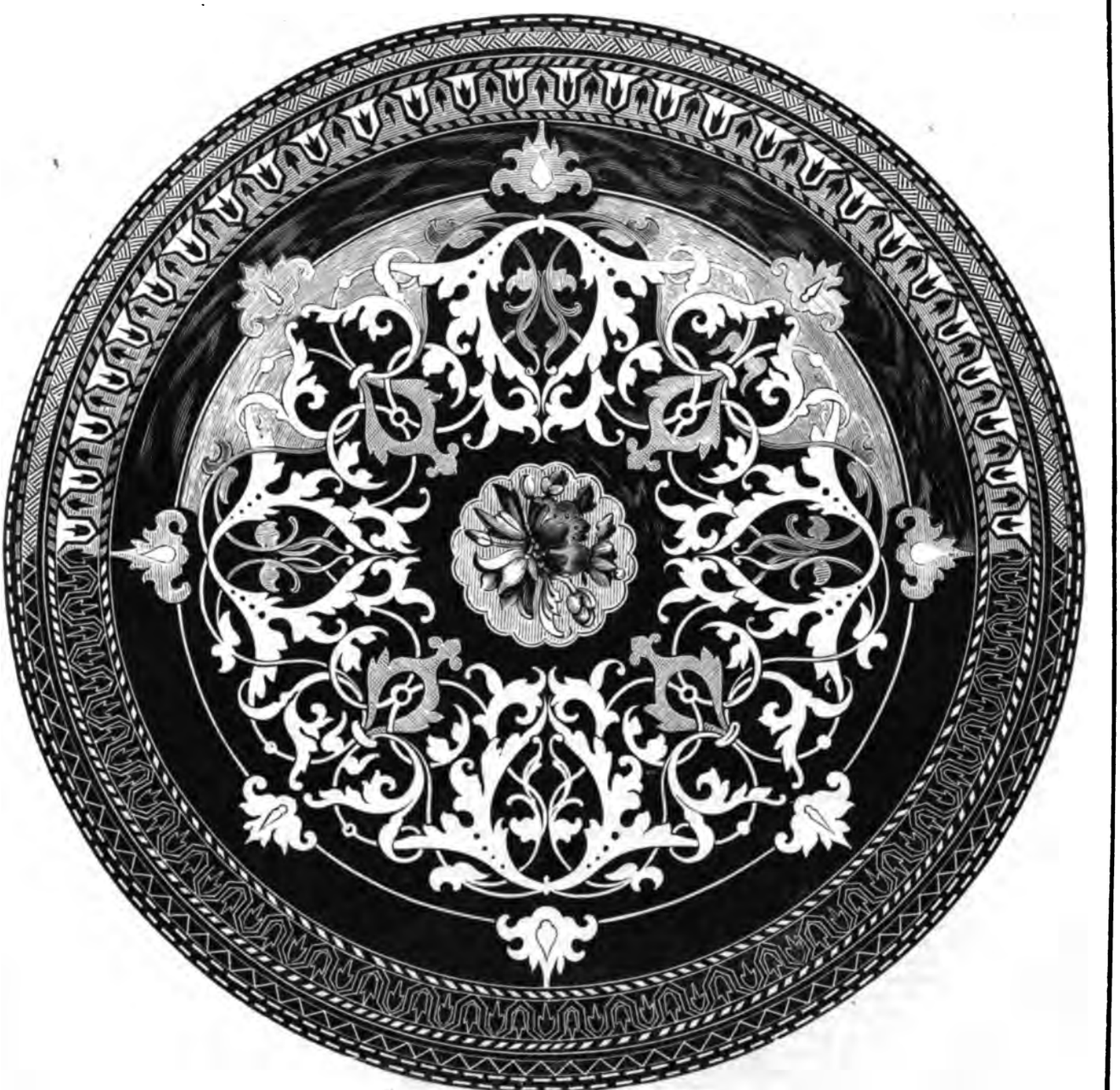
No city of the ancient or modern world ever rivalled Athens in the riches of Art. Our best-filled museums, though teeming with her spoils, are poor collections of fragments compared with that assemblage of gods and heroes which peopled the Acropolis, the genuine Olympos of the Arts, where all the divinities of the pagan heaven appeared grouped in immortal youth and beauty round the Thunderer and his Virgin daughter. Many volumes were written in antiquity on the pictures, statues, and architectural monuments which thronged the summit of this rock. And though those works have perished, a long and curious list might still be given of the objects of this kind which we know to have existed there. Wherever the Athenian set his foot, the very earth appeared to grow more lovely beneath it. His genius beautified whatever it touched. His imagination vivified everything. He spread a rich mythological colouring over land and sea. Gods, at his bidding, entered the antique oak, sported in the waters of brook and fountain, scattered themselves in joyous groups over the uplands and through the umbrageous valleys, and their voices and odoriferous breath mingled with every breeze that blew.—*St. John's "Hellenes."*

ALPHABET (GERMAN TEXT).



TOP FOR A TABLE IN PRINTED VENEER.

ALPHABET (GERMAN TEXT).



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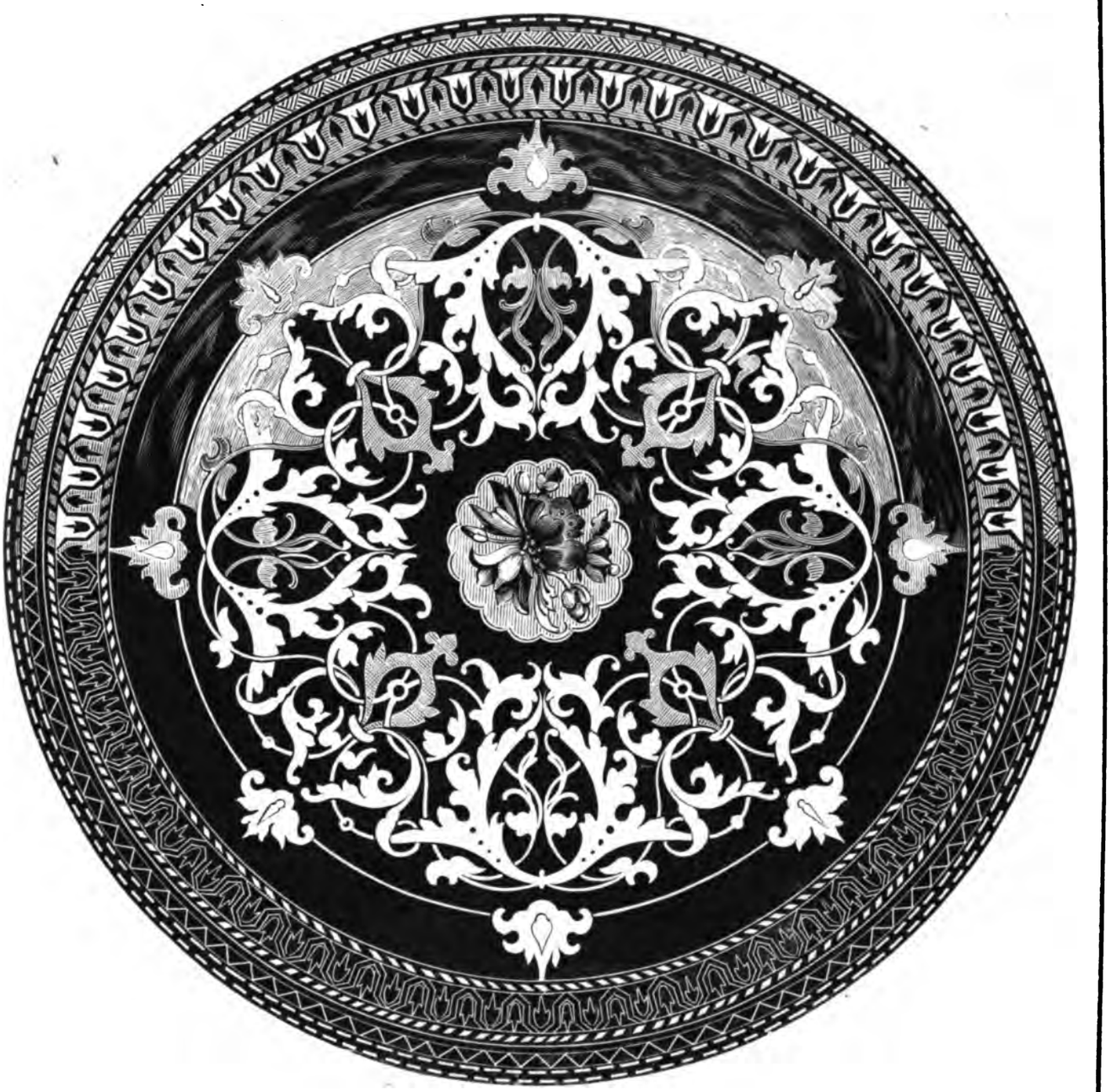


TOP FOR A TABLE IN PRINTED VENEER.

INTERCOLUMNIATION. The distance from column to column, the clear space between columns, is called the intercolumniation.

LABEL. The level moulding or dripstone over a door or window, common in the later pointed works. It is generally turned down at the ends at right angles, and slightly returned again horizontally and outwards.

LACUNAR. A panelled or coffered ceiling or soffit.

LANCET. A term familiarly applied to the simplest form of the pointed arch, which is that of the outer end of the surgical instrument, the lancet.

LANTERN. A turret raised above a roof or tower, and very much pierced, the better to transmit light. In modern practice, this term is generally applied to any raised part in a roof or ceiling, containing vertical windows, but covered in horizontally.

(To be continued.)

Statuary.

BY LEON BAPTISTA ALBERTI.

I have often thought that imitative Art had its origin in the observation of certain lineaments in different materials, so disposed by Nature, that by altering or inverting something or other in their form, they were capable of being made to resemble the figures of living creatures. From this crude beginning sprung the art of design, by which men are enabled to express original conceptions of their own in the various forms which constitute the circle of the fine and ornamental arts.

Figures are fashioned in two ways, first, by adding to, and secondly, by taking away from the mass of material operated upon. The first includes modelling in wax, plaster, or clay; the second consists in reducing solid marble, wood, &c., to the desired form.

Correct proportion is indispensable in all statuary, and this is attained by the use of two instruments—a large ruler and two moveable squares. With the ruler we take the length of the parts, and with the squares we take their diameters and other proportions. Upon the ruler let there be a line drawn of the length of the body you desire to measure, from the top of the head to the sole of the foot. Divide the ruler into six equal parts, to be termed feet; and these again into ten equal portions, to be called inches. The whole length of this measure, therefore, will consist of 60 inches. These inches are now to be subdivided into 10 equal parts, or minutes. This division of the measure gives a total of 600 minutes—there being 100 in each of the six feet.

Whatever may be the height of the statue required, your ruler must be equally high, and divided in like manner as directed above. There are two squares used; the first is made thus:—

Let two rulers, in the nature of straight lines, *a b* and *b c*, be joined together, so as to make a right angle—the first ruler, *a b*, falling perpendicularly, the other, *b c*, serving for the base. The bigness of these squares is to be so ordered that their bases shall consist of at least 15 inches, according to the proportion of the ruler already described. The base is to be divided and marked in the same manner.

Another square is to be joined to the above, as represented in the engraving, *d f g*, so that *g f* serves for straight line and base for both.

With these instruments the diameter of any part of the animal frame may be readily taken, as, for example, the widest part of the human head, *h i k*, which is effected by bringing the two straight rulers, *a b* and *d f*, of each square exactly opposite to each other, so as to touch the points, *h i*. The diameter is then read off from the base.

(To be continued.)

ABRAHAM VANDERDOORT.

It is not generally known that Vanderdoort, the keeper of King Charles the First's collection of pictures, hanged himself in despair at having mislaid a picture of his master's. Our authority is Sanderson, a contemporary of Vanderdoort, from whose "Graphice" we transcribe the following passage:—"We read of kings and nations that have valued painters, so have they sought their paintings for their weight in gold, for 100 talents, for 6,000 testers, 12,000 testers; nay, some pieces were preserved with so much safety that their *keepers' lives* have been responsible for their security. An example of that nature we had in Abraham Vanderdoort, Supervisor of the late King Charles his repository of rarities, with especial command and care of one most excellent piece of miniature, which, therefore, he lodged (more secure than safe) so farre out of the way as not to be found by himself, when it was missing to his own memory, at the King's demand, till, after his death, the executors brought it home. This chance fitted the story, which was (*of the lost sheep found*) the design of the Limner, a shepherd bearing upon his shoulder a straid sheep to the fold. The doctrine: Christ reclaims the sinner. But miserable it was to the poor man who at first, for fear of his master's displeasure, or perhaps his own love to the excellency of that Art, in sad regret *went home and hanged himself*." O honest Vanderdoort! thou, who hanged thyself for a bit of a picture, should have lived in our days, to witness the destruction of so many masterpieces of our National Gallery, through the ignorance of thy successors, though thus far, not one of these Vandals, unable to hang a picture, has hanged himself!

Technicologia.

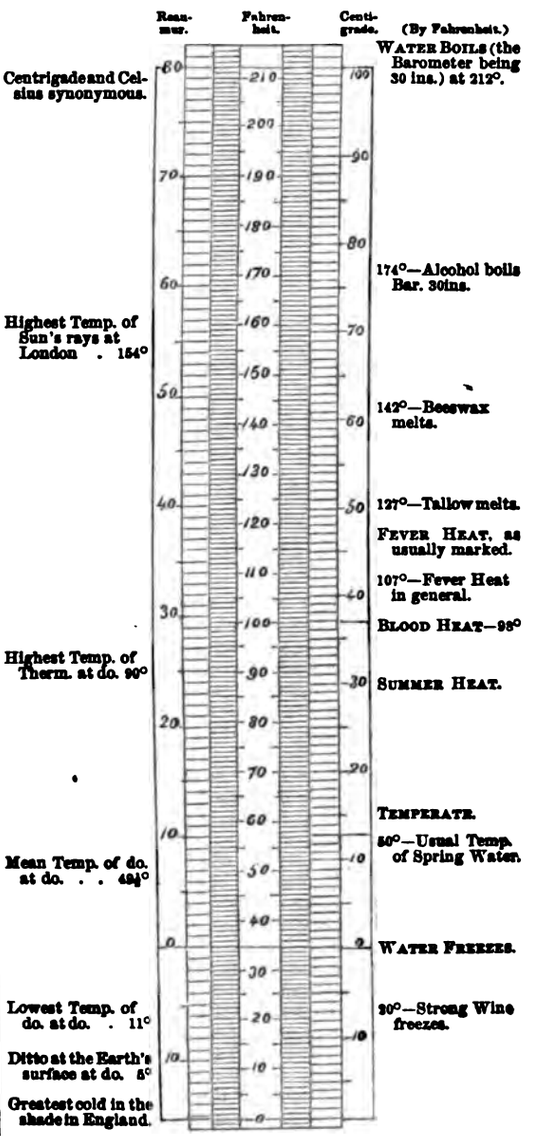
177. *Thermometers.*—In the present cultivated state of philosophical knowledge, it can hardly be supposed that the reader has not seen a thermometer. Minute description is therefore unnecessary. But as the accurate construction and subsequent improvement of this instrument must greatly depend on the knowledge which those who use it may possess of the method of making it; and as we have no perfect account of this, there can be no doubt but a short relation of the whole process, from experimental knowledge, will be acceptable.

The tubes may be had at the glass-house; and the first care of the artist must consist in examining whether their cavities be equal or cylindrical throughout. This is done by immersing one end into mercury, and withdrawing it, after closing the other end with the finger. By this means a small quantity of mercury will enter the tube, which will occupy a longer space the deeper the tube is immersed. Lay the tube horizontally upon a graduated rule, and observe the length of the mercurial column in different parts of the tube, to which it may be made to run by inclining it more or less. If the length continue invariably the same, it is a proof that the tube is uniformly cylindrical; but if otherwise, the diameter varies, and the tube cannot be used to make a good thermometer, unless the graduations in the different parts of the tube be lengthened or shortened, in proportion to the measures of the mercurial column.

Direct the flame of a large candle, a watch-maker's lamp, or, which is cleanliest and best of all, a lamp with alcohol, upon one end of the glass tube, by means of the blowpipe. The extremity will soon become red-hot, and in a state of imperfect fusion. Remove the tube from the flame, and blow into its other end, and the heated part will be inflated so as to form a bulb. This last inflation is the most difficult and laborious part of the business; but it may be performed with great ease and advantage, by previously fastening the neck of one of the small bottles of elastic gum, or Indian rubber, about the end of the tube; which, when the other end is ignited, may be pressed by the hand, so as to blow the bulb very commodiously, and without the introduction of any moist air.

Immerse the open end of the thermometer tube into some clean dry mercury, that has been boiled, and warm the bulb with a candle; part of the air will be immediately heard rushing through the mercury; withdraw the candle, and as the bulb cools, the mercury will rise in the tube. This will be facilitated by holding the tube as near a horizontal position as can be done, without raising its lower end above the surface of the mercury. In this way the bulb will be nearly half filled. Without altering the position of the apparatus, move the whole so that the bulb may be held over a candle. A small candle newly snuffed is best, because of the steadiness of its flame; and it will be necessary to wrap a piece of paper round the tube, to defend the finger and thumb from its heat. The mercury will soon boil, and most of the remaining air will be heard escaping from the bulb. As soon as this escape has ceased, remove the bulb from the candle, and it will be suddenly filled with mercury from the vessel.

Take the thermometer thus filled out of the mercury, and wrap round its open end a piece of thin paper, in such a manner as to leave a cavity beyond the tube, at least sufficient to hold as much mercury as the bulb contains; secure this by wrapping it tight with packthread about the tube; then put a drop of mercury into the proper cavity, and apply the bulb again over the snuffed candle, holding the tube upright between the finger and thumb, or a pair of small pincers, at the part wrapped with paper and packthread; the mercury will soon boil, and about half the contents of the bulb will rush violently up the tube into the paper. Remove the bulb from the candle, and the mercury will suddenly return; then boil it again, and repeat the operation till the speedy boiling of the mercury, when placed over the candle, and the diminished noise and agitation, shew that the whole has been well heated, and deprived of the air or moisture which might have adhered to it.


Reaumur.
Fahrenheit.
Centigrade.
(By Fahrenheit.)
WATER BOILS (the Barometer being 30 ins.) at 212°.
Centrigade and Celsius synonymous.
174°—Alcohol boils Bar. 30ins.
Highest Temp. of Sun's rays at London . 154°
142°—Beeswax melts.
127°—Tallow melts.
FEVER HEAT, as usually marked.
107°—Fever Heat in general.
BLOOD HEAT—98°
Highest Temp. of Therm. at do. 90°
SUMMER HEAT.
TEMPERATE.
50°—Usual Temp. of Spring Water.
Mean Temp. of do. at do. . . 49½°
WATER FREEZES.
Lowest Temp. of do. at do. . 11°
20°—Strong Wine freezes.
Ditto at the Earth's surface at do. 5°
Greatest cold in the shade in England.

The operation of boiling will fail, if the mercury or the inside of the bulb be moist; for in this case the bulb is usually burst by the mercurial vapour: the explosion, however, is not dangerous: it is very likely to happen with bulbs blown by the mouth, unless they be kept some weeks in a dry place before they are filled. The same danger makes it prudent not to boil the mercury strongly the first or second time; and it is likewise of importance, to keep the bulb clear of the flame, as the contact of this last against the empty part of the bulb would melt it, and a hole would be immediately made by the excluded vapour.

After the boiling is completed, plunge the bulb into cold water, the temperature of which is known. Melting ice or snow (or snow and water) always has the temperature of 32° of Fahrenheit's scale. Then take off the paper, and put the bulb into the hand, and afterwards into the mouth; this heating will cause some of the mercury to drop out of the tube. Cool it again to 32°, by immersing it in the cold water, and mark where the mercury stands. The distance between this station and the top of the tube measures the interval between freezing and blood-heat, or 32 and 95, which makes 63 degrees; and will consequently shew whether the degrees will be large or small, and what extent the scale is capable of; that is to say, it will shew whether the bulb be of the proper size. This last, supposing the judgment of the operator not sufficient to proportion the bulb nearly to the tube and the intended scale, might however have been more conveniently ascertained after the first filling, before the boiling had been undertaken.

When the number of degrees to which the length of the tube will extend is thus known, the operator must settle whereabouts he will have the freezing point, which may be nearer or farther from the bulb, accordingly as he intends the instrument to be used, more particularly to ascertain great degrees of heat or of cold. At this stage of the business, likewise, he may heat the upper part of the tube with the blowpipe, and draw it out to a fine capillary tube ready for sealing. The bulb must then be heated in the candle, till a few particles of mercury have fallen off the top of the tube; and notice must then be taken how much nearer the freezing point is to the bulb than before; which may be done by immersing it in the melting snow as before. If it be not as low as desired, the heating must be repeated, carefully observing not to throw out too much mercury at a time.

When the due quantity of mercury is thus adjusted, two candles must be prepared, the one to heat the bulb, and the other to close the tube. The blowpipe being in readiness, the upper part of the tube near the flame of one candle, and the bulb near the flame of the other, the mercury will rise, and at last begin to form a globule at the point of the capillary tube. At this instant the bulb must be withdrawn from the lower candle at the same time that the flame of the upper is directed by the blowpipe upon the point of the tube. This last will be immediately ignited, and will close by the melting of its parts, before the mercury has perceptibly subsided. When the mercury has fallen, this closure may be rendered more secure from accidental breaking, by fusing the whole point of the tube till it becomes round.

If this business be properly done, the mercury in the instrument thus filled will run backwards and forwards in the tube, immediately upon inverting its situation.

In the original graduation of thermometers, two fixed points of temperature are necessary. These are the freezing point of water, or temperature of ice or snow, at the instant of formation, or rather when it is just beginning to liquefy; and the boiling point of water, or temperature at which, under a known pressure, it is plentifully converted into steam. For the settling of the freezing point, nothing more is necessary than to immerse the thermometer so deep in melting snow or ice, as that the mercury may be barely visible above its surface, and carefully mark the place at which it stands. The boiling point is not quite so easily ascertained; crude, hard, or saline waters acquire a greater heat in boiling than such as are purer; and the same water will acquire a greater heat under a greater pressure. For this last reason, the boiling point should be fixed according to the decision of the committee of the Royal Society; namely, when the barometer stands at 29·8 inches.

The thermometers most in use at present are Fahrenheit's, Reaumur's, and Celsius's. The Centigrade thermometer of the modern French writers is nothing more than the common Swedish thermometer, or that of Celsius under a new name. In Fahrenheit's scale the number of degrees between the freezing and boiling-water point is 180; the freezing point being at 32°, and the boiling-water point at 212°, both above 0°, or apart from which the degrees are reckoned both ways. In Reaumur's scale, the number of degrees between these two points is 80, and the freezing point is called 0°, from which the degrees are reckoned both ways. In Celsius's thermometer, the interval is divided into 100°, and the freezing point is called 0°, as in Reaumur's.

The zero of the Centigrade and of Reaumur's thermometer each corresponds to 32° Fahrenheit.

To convert degrees of Reaumur into equivalent degrees of Fahrenheit, multiply the degrees of Reaumur by 9, divide the product by 4 and add 32; the result will be the degrees of Fahrenheit. 9 Fahrenheit, 5 Centigrade, and 4 Reaumur are equivalents. In Wedgwood's Pyrometer the zero commences at 1·077° Fahrenheit; and each degree, instead of being equal to 130° of Fahrenheit, as was supposed by its maker, is only equal to about 20°.—*Brayley's edit. of Parke's "Chymical Catechism."*

Easy Rules for the Reduction of Scales.—To convert Reaumur into Fahrenheit multiply by 2·25, and add 32°.

To convert Centigrade into Fahrenheit multiply by 1·8, and add 32°.

THE ARCHITECT.

As with artisans, so with artists, we see the most striking proofs that man can least appropriate to himself that which most completely belongs to him. His works leave him as a bird leaves the nest in which it was hatched. The lot of the architect is in this respect strange above all others. How often does he direct his whole mind and soul to the constructing and perfecting of rooms from which *he* must be for ever shut out! The royal halls are indebted to him for a splendour the full effect of which *he* can never enjoy. In the temple, he fixes an impassable barrier between himself and the Holy of holies. The steps which he has laid for the celebration of the heart-elevating mysteries, *he* must never venture to ascend; as the goldsmith looks with distant reverence on the sacred chalice, to the gold and gems to which he has given shape and brilliancy. With the keys of the palace the architect delivers up to the rich man all its conveniences and enjoyments, of which *he* is never to share in one.

CENTREPIECE (ARABESQUE)

PANEL ELIZABETHAN.

Fresco Painting in Architecture.

By J. Norton, A.I.B.A.

WE have to consider:—First—In what does true fresco painting consist? The Italian word literally signifies new or fresh, as applied to the laying on of the colours to the newly-stuccoed or moist walls, in such a manner as to become incorporated with the lime and sink into the substance of the walls, and thus become a part of the building.

Numerous authors of note have written treatises upon the proper method of preparing the walls and ceilings, and the choice of colours suitable for what may be called painting with coloured lime-water; but as the details are very tedious, especially in the works of Vitruvius and his commentators, and of Vasari, I shall give but a brief epitome of the directions they insist upon most strongly; and if the student is desirous of more extended information, I recommend him to study an excellent treatise by Mrs. Merrifield, in which reference is made to the ancient authorities.

1. The wall should be made perfectly smooth, and be saturated with water, and upon this is to be applied the first coating of mortar, called the *arricciato*, composed of one part lime to two of sand, if the lime be fresh; the lime and sand are to be well mixed with water, so that the lime is thoroughly slaked, for if heat is allowed to remain in it, it will burst and crack the plaster. Vitruvius advises lime and brick-dust, and no less than six coats of plaster, the three first with lime and sand, and the three last with lime and marble-dust, each coat thinner than the last. Alberti mentions having seen ancient examples in which nine coats were laid on each other. The utmost care is required to prevent unevenness of surface, as that would be damaging to the pictorial effect, and in the ancient frescoes of Roman date the surface was highly polished. I may here notice, that even in this apparently trifling matter, the practice of the ancients excelled the moderns, for the well-known care bestowed by them in mixing their mortars and stuccoes, has preserved to us in the ruins of Pompeii, Rome, Herculaneum, and elsewhere, the most delicate paintings in fresco; whilst the ill-prepared walls at the Campo Santo, at Pisa, and throughout Northern Italy, have left us but patches and ghostlike vestiges of works executed in ages comparatively modern; and sad it is to hear of the destruction still daily going on of works which give a romance and glory to that land far beyond the power of arms or conquest.

The lime used was preserved in water two or three years; indeed, an ancient law forbade the use of lime for this purpose that was less than three years old; and milk being worked up with it instead of water, added to its solidity and whiteness. Strange, indeed, would it be if, with all this care, the plastered surfaces of the ancients cracked like our modern contract work.

The plaster, when sufficiently dry, was ready for the artist, who sometimes outlined with charcoal or colour his day's work, or giornota, at once on the wall from a small sketch; at other times, pounced with charcoal dust the outlines of his already prepared cartoon on the wall through punctured holes, or marked or indented the lines with an iron stile. The whole surface was then covered with a fine and thin coating of lime and marble dust, called the *intonaco*, and upon this moist surface the colours were laid. Other authorities say the outline was traced *upon* the intonaco.

2. The colours used were invariably mineral or natural, because artificial colours always change by exposure to the atmosphere, and upon many colours the lime produces a destructive effect.

Works in "true fresco" have been exposed to the external air for ages without damage, and this gives it a great advantage over secco distemper or tempera painting. The works of the great master-minds were begun and finished in fresco, but those of less calibre were in the habit of finishing their works in secco—a vicious practice of mixing ultramarine and other delicate colours with white of egg and other tempera. As far as I can learn, the ancients always worked in the first mode, but many of the artists of the Revival invariably commenced in fresco and finished in secco; and hence the deterioration of their works, from the cracking or peeling off of those portions not incorporated into the plaster, and thus easily acted upon by the atmosphere.

The history of art is little more than a history of fresco painting; and no artist of note, from Cimabue and Giotto down to the Caracci and Romanelli, placed his hopes of immortality upon works executed in any other manner.

The grand work of Michelangelo in the Sistine Chapel has recently been described by Mr. Scharf, and in it we see the climax of the schools of Tuscany culminating in the superhuman genius of this wonderful Florentine. He was the first of the Renaissance artists who completely changed the old Greek stiff and conventional drawing—the round staring eyes, the attenuated and pointed feet and hands, and the rigid folds of the draperies, peculiarities observable in our own Norman and the continental Romanesque.

The chapel called the Arena, because built within the precincts of an ancient amphitheatre, was built by the Scrovigno family about 1303 (it is supposed) for the knights of the order of St. Mary, and, being dedicated to the Annunciate Virgin, accounts for the great prominence given to the events of her life, as we shall presently see. The chapel is externally of simple character, but with a singular mixture of Roman and Italian Gothic detail. Internally it consists of a single parallelogram, 27 feet 6 inches wide and 66 feet 6 inches long; circa, 2½ diameter; and a narrow chancel, or sanctuary, exactly another diameter in length; the side walls are 34 feet 7 inches high to the springing of the circular-barrel vault.

In the year 1306 Giotto was commissioned to fresco the walls and roof. The side walls and roof were divided into two leading divisions or bays by three bands, circa 3 feet 6 inches in width, composed of medallion heads, arabesque foliage, on blue and red grounds, and a multiplicity of narrow lines of red, green, diapered gold and sepia; in all cases the panels and subjects carefully divided by means of a distinctly marked line of pure white colour following carefully the intricacies of the patterns. A peculiar ornament of common occur-

rence in the borders is an imitation of Roman mosaic, the tesseræ being formed of red, blue, and white. The main bays are each subdivided (by similar borders 3 feet 1 inch in width) into three panels in height and three in width, which is, however, varied in the south wall by the six windows which occur, and reduce the panels to sixteen; whereas on the north wall there are eighteen. On these thirty-four panels are depicted events from the life of Our Lord and of the Blessed Virgin. A dado runs round the chapel to about 11 feet in height, with imitations of architectural enriched mouldings; and the wall space below each tier of subjects is divided into double panels of rosso marble by borders of a darker tone; the three leading and four subordinate bands, or wall borders, continue through the dado, and the fourteen panels thus formed are occupied by the cardinal Virtues, with their opposite Vices, painted in low monotone, so as not to attract the eye from the principal subjects above. On the west wall, over the doorway, is painted the "Last Judgment," and is similar to the usual treatment of this subject. The figure of Our Lord, in an aureole or vesica, occupies the central space below the three-light window, and over the door is an enormous Latin cross borne by angels. The upper part of the east wall is occupied by Our Lord enthroned in glory, and the spandrils of the arch with the Angel Gabriel, and the Virgin of the Annunciation; and below, two subjects of the series before described, making altogether thirty-eight subjects. The vaulted ceiling is painted in deep blue, powdered with golden stars, and the two bays are distinguished by large central circles, supported by four smaller ones, in which are depicted, on a gold ground, the Madonna and Child and Our Lord, with medallions of the Evangelists, and the four greater Prophets bearing scrolls. The effect of the whole is described as brilliant and harmonious in the extreme; for with this, as with the works of most of the early masters, there is a general connexion and harmony, or, in Mr. Ruskin's words, "their pictures were nearly always parts of a consecutive and stable series, in which many were subdued, like the connecting passages of a prolonged poem, in order to enhance the value or meaning of others."

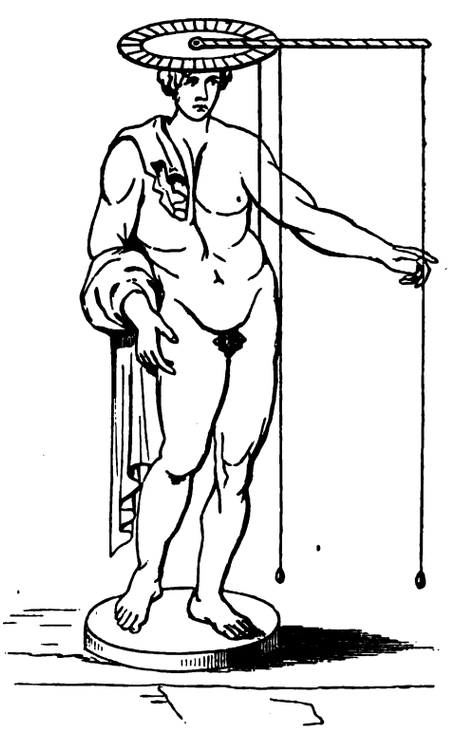
Statuary.

By Leon Baptista Alberti.

(*Continued from page* 10.)

The next consideration, after the proportions of the figure have been duly taken, is that of limitation, or prescription of bounds, consisting in the fixing of a certain period in the drawing of all the lines, so as to direct to what point they are to be continued, whether extended in length or the reverse; how angles are to be fixed, how parts are to be raised or depressed by alto or basso relievo. The best way to effect this object is by the employment of an instrument consisting of three parts, a horizon, a stile, and a plumb. The horizon is a plane designed upon a circle, which circle is to be divided into equal parts, marked with their several members, and their subdivisions set over against each part. The stile is a straight ruler, one end of which is fixed in the centre of the circle described above, while the other moves freely over its circumference. The plumb falls parallel with the figure from the top of the stile to the floor or plane. The method of making this instrument is as follows:—Take a smooth board, upon which draw a circle three feet in diameter; divide the circumference into equal parts (called degrees), and subdivide these degrees as much as may be thought necessary. For example, suppose every degree to be subdivided into six lesser parts or inches, these inches are again subdivided into six parts called minutes. The degrees are to be numbered 1, 2, 3, 4, &c. This is the horizon. The stile is formed of a thin straight ruler, three feet in length, extending beyond the circumference of the circle. Upon this stile is to be marked out the inches it is to contain, subdividing them according to the directions already given. The complete instrument is called a definitor.

The definitor is set upon the exact centre of the head of the figure, and made fast. Note the point where it is fastened, and mark it by setting up a pin or needle for the centre of the circle; next, by turning the instrument about from the determined place in the horizon, make out the first designed degree, so as to ascertain from whence it is moved; which may best be done by bringing about the stile until it arrives at that part of the horizon where its first degree is marked. Holding it fast there, turn it about together with the whole circle, until the plumb-line touches some principal part of the statue, such as the finger of the right hand. This will serve as the place from whence upon every new occasion the whole definitor may be moved, and afterwards brought back again to its original position; yet so that by the turning of the stile about the pin or needle, the plumb which before fell from the first degree of the horizon may return to touch the finger of the right hand.



Example.—Supposing that it is required to take the angle of the right elbow: fix the definitor with its centre, which is upon the head of the figure, as above described, in such a manner that the plane on which the horizon is designed may stand firm; then turn about the stile till the plumb-line touches the left elbow of the figure, carefully marking how far the stile in the horizon is distant from the place whence it was first moved, upon what degree of the horizon the stile lies, how far distant the elbow is from the centre of the circle, and ascertain, by placing the module or foot measure perpendicularly upon the plane on which the figure stands, how many inches and minutes the elbow is raised above that plane.

(*To be continued.*)

Ancient Timber Framing.

By Ralph Brandon, Esq.

In every building the two most essential parts are the walls and roof; yet, as if by common consent, until lately these have both been concealed—the claims of the roof have at last been recognised, and it is rare now that we find it hidden as a thing to be ashamed of, so for the present we will say no more on that head; but it is still so usual to spoil the effect of buildings by concealing the wall space with false constructional features, that I cannot think a few words on that subject will be out of place.

Let us turn our attention to the architecture of the middle ages. Any one looking at the remains of old castles and fortified places of those times cannot fail being struck with the grandeur of effect produced by very simple means. This is owing mainly to the breadth with which the walls are treated. Unbroken masses of masonry, either circular or square on plan, rise majestically from the ground to the top stories, which are formed by bold projecting machicolations supporting the galleries of defence just under the eaves of the roofs. This, it may be argued, is the effect of chance—that the buildings in question are just what were required for places of defence, and that any projecting decoration would have been not only out of character, but would in some measure have defeated the object of the builders: true, that therein lies the excellence of the works. And look from these castles to any other buildings of the best periods of the middle ages, and you will still find the walls treated with the same dignity, the only constructional features (with one exception) which project beyond their surfaces being base mouldings, string-courses, hood-mouldings over the openings, and the cornice under the eaves of the roof, which was, in fact, the gutter to carry off the rain-water. The base moulding and string-courses occur where the walls diminish in thickness, and serve to throw off the wet from the lower services, or else were used as ties or bond through the masonry of the walls. The hood-mouldings were used to prevent the wet from following the mouldings of the arches down over the doors and windows. No other constructional features projecting from the walls occur in any of these buildings, with the single exception of buttresses, and these should only be used where any extraordinary pressure from within the building—such as the thrust of a vault, or any large arch—requires an abutment stronger than the wall itself would afford.

In Gothic architecture, after their first necessary introduction, it appears to me that buttresses were in later times often employed more for decoration than use, much to the detriment of the effect of the buildings in which they occur. This, in future architecture, should be strictly guarded against.

Any other projections beyond the surface of the walls in buildings of the period of which we are treating, such as porches, bay windows, oriels, &c., must be looked upon as—and are, in fact—parts of the walls themselves, occasioned by the irregularities of the plan, which, of course, would be made to suit the requirements of the building.

One great advantage that was gained by preserving these broad surfaces of wall, was the bold and powerful effect of masses of shade thrown from the projecting portions of the building, and the clear cutting contrast of the openings therein. They also served to bring out in stronger relief any legitimate objects of decoration, such as statues supported on brackets, or standing under canopies, &c.

The arches and jambs of window and door openings were always of dressed stone, deeply recessed, and frequently well moulded; but the mouldings—with the single exception, before mentioned, of the hood-moulding—never projecting from the surface of the walls. In classic architecture, on the contrary, it is the usual practice to project all the mouldings above the windows beyond the face of the wall, and to support them on columns or pilasters.

Now practically, all that is necessary to bridge over the space of a door or window opening is an arch or lintel of the same thickness as the wall itself; a projection for that purpose, therefore, beyond the external surface, is useless, and as such should be avoided; besides that, any projection from the wall, as we have shewn, tends to diminish the grandeur and repose of effect in the building, by frittering and cutting it up. I know of no instance that better exemplifies this defect than the building known as the Banqueting House, at Whitehall, which, unless looked at almost directly opposite, appears a confused jumble of columns, pilasters, and cornices,—the entablatures broken over each column serving greatly to increase the confusion. In this building all idea of the wall performing its duty is utterly lost, though if one proceeds to analyse the design, it is impossible to assign a practical use to any of the many architectural features so profusely collected together.

Porticoes, as entrances to mansions or public buildings, are not so well suited to this climate as projecting porches, on account of the little protection they afford from the wind and rain; and when, as is often the case, they are erected of greater height than the storey to which they form the approach, they not only fail in affording any protection, but altogether destroy the grandeur of the buildings to which they are attached. At the London University, the portico—which is used as an entrance to the first floor, instead of the ground storey—is approached by a complicated arrangement of external steps, and actually rises higher than the main body of the building itself, giving it the appearance of an immense portico, which it might be imagined formed the approach to a large building in the rear, with a low wing on either side; but there is no large building in the rear to communicate with this enormous portico, and after the visitor has toiled up the flights of steps and passed into the interior through the central door, a feeling of disappointment is the

natural result, reminding him forcibly of the mountain in labour, which, after all its heavings and groaning, produced only a ridiculous mouse. At the Custom House, London, an almost more ridiculous attempt at a portico has been stuck on to the centre of the principal façade, without any access to it except through the windows of the first floor (the excuse for this, no doubt, would be that it was intended as a balcony and not a portico); but it is probable that the author of this absurdity never contemplated the possibility of any one being foolhardy enough to use it at all, as it has no breastwork or parapet to prevent an unwary visitor from falling to the ground, who, in his simplicity, might be excused for imagining that a portico was naturally intended for ingress or egress to a building of which it formed the principal feature.

In Gothic architecture porches were never erected except as entrances to buildings. They are met with in infinite variety, from the small plain porch of a village church to the magnificent portals of Chartres, Amiens, Rheims, and other continental cathedrals; but as they increased in size and richness of decorations, according to the size and magnificence of the buildings to which they formed the approaches, they varied also in design, no two ever being found alike. Now in the so-called classic architecture a large portico is merely a magnified copy of a smaller one.

Let us now turn from stone to timber-framed buildings. Here the material to be employed was altogether different in its nature and properties, and required a distinct mode of treatment. For a building erected principally of timber, posts and beams were the essential features, with braces—straight or curved—to prevent their racking, and brackets to support the projecting parts. This was the natural and rational mode of employing it; and the medieval architects, taking it for their groundwork, succeeded in producing a style of architecture different from any that had preceded it, and have handed down to us buildings of exquisite beauty and wonderful variety of design.

How differently did the architects of the last century employ the material by their columns, pilasters, entablatures; and all stone features, even to the rusticatations, were executed in their wooden buildings in exact imitation of the Italian or Roman stone buildings which they took for their models, without for a moment considering whether they were suitable either for the purposes required or for the material they had to work with. The builders of the present century have even gone further in their debasement, and actually sanded and painted their woodwork in imitation of stone, and no doubt thought this a most ingenious device. To shew that they did, I will give an extract from a work published on the practice of modern Gothic architecture, by an architect, in the year 1828, in which the author, after alluding to the taste for the Gothic style having then become prevalent, says:—

"I am induced to make some observations on the true style or character applicable to houses of this description, and the materials to be employed therein.

"The buttresses of houses in the Gothic style should be of bricks to receive stucco, but the side (or walls) may be of quartering, filled in, or what is commonly called brick nogging. The pinnacles may be of stone, artificial stone, or wood painted and sanded to look like stone. The side or walls should be covered with stucco."

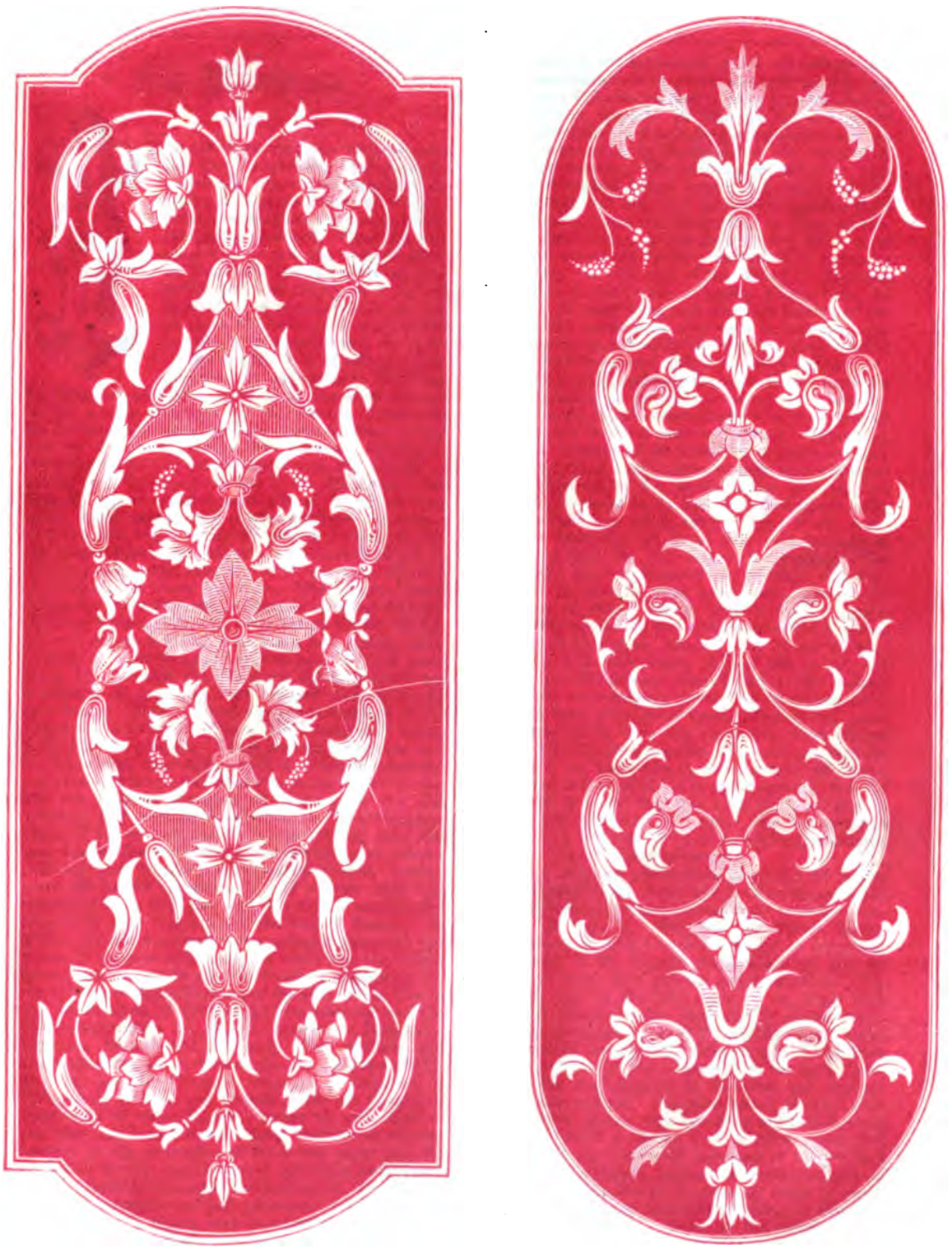
Happily for architecture, thirty years have done much to overthrow such false notions.

(To be continued.)

GEOMETRICAL MOSAIC.

The revival of geometrical mosaic as a structural adjunct may be said to have commenced in 1839 and 1840, with the attempts of Mr. Blashfield to produce satisfactory pavements by the employment of coloured cements, inlaid asphaltes, and Venetian Pisé work; with the clever inventions of Mr. Singer, of Vauxhall, aided by his ingenious assistant, Mr. Pether, and last, but not least, with that brilliant idea of Mr. Prosser's, of solidifying China clay in dry powder, by subjecting it to great pressure in iron moulds from which it could not escape, and thus, at the same time, avoiding the shrinkage due to the evaporation of the moisture previously indispensable to keep the clay in a plastic state, and obtaining, by the forcing together of the moleculæ, a substance of extraordinary density and evenness of texture throughout its body. Quite recently, I may here mention, a process has been invented by Messrs. Maw & Co., who are now actively engaged in the mosaic business, whereby that closeness of texture, and consequent hardness of surface, only to be obtained by aqueous shrinkage, may be given to tesseræ, hitherto dependent for hardness upon the mechanical pressure of materials in a dry or nearly dry state. Of Messrs. Blashfield's, Singer's, and Prosser's abilities, Mr. Minton availed himself largely. Mr. Blashfield carried on an active agency for him in London. From Mr. Singer he took out a licence for a patented system of laying small tiles and tesseræ, and in Mr. Prosser's patent he became largely interested. The object for which Mr. Prosser's presses were first set to work were the manufacture of buttons of different kinds; and for some time a very large trade was driven in this department of industry. Subsequently, however, the ingenious automaton machine, invented by M. Bapterosse, of Paris, by means of which multitudes of buttons are made at every stroke of the die, and at once carried off into a reverberating furnace, by means of which they are fired in about ten minutes, superseded Mr. Prosser's original form, and Mr. Minton abandoned the manufacture of buttons. It was, I believe, Mr. Blashfield who suggested to Mr. Minton the applicability of the process to the production of tesseræ, or small cubes, suited for the formation of tesselated pavements, in imitation of those of the ancients. Mr. Minton went into the matter with great spirit, and excellent tesseræ of all colours were speedily made. For their arrangement Mr. Owen Jones suggested many very beautiful geometrical combinations. In the winter of 1844 I went abroad to study my profession, and took with me a commission from Mr. Blashfield to collect for him any thing I might meet with calculated to assist in utilising these tesseræ, upon the manufacture of which Mr. Minton was at that time entering. Finding in Italy and Sicily a good deal of material to which, as far as I could ascertain, no one had previously paid much attention, I was induced to make the series of drawings subsequently published in my work on the "Geometrical Mosaics of the Middle Ages." Mr. Blashfield having shewn the drawings to Mr. Minton during my absence, on my return, in the spring of 1847, I found the latter anxious to employ me to assist in the extension of his views, both with respect to tesselated work in general and its combination with encaustic tiles. My first interview with Mr. Minton was in reference to the pavement for Osborne, upon which he consulted me professionally, and from the date of that interview until his death I was happy in securing his kindly interest and regard.—*M. D. Wyatt.*

FRIEZES (GOTHIC).



FINGER PLATES (ITALIAN)

Silk Manufacture.

IT would seem that the Chinese were the first people who systematically reared the silk-worm, eventually established the manufacture of silk as a regular employment, and trafficked in the fabrics produced. They also supplied Europe and the western states of Asia with the raw material from which both the tissues of Tyre and Berytus were manufactured, as well as those of Persia at a much earlier period. It is probable that the island of Cos was the seat of silk manufacture at a very early period; Pamphila, the daughter of Piatus, standing in the same relation to the art as practised by the western nations as the Empress Pee-ling-shee does to the Chinese; except that the former is said to have been the inventor of the manufacture, whilst the latter has the honour of having first developed the use of the silk-worm. The Romans appear to have used silk as largely as their means would permit, and chiefly obtained the tissues from the East, but the price was of such a character that the Emperor Aurelian refused his wife a robe of silk on the very reasonable ground that he could not afford it, or, at least, that it was too dear. The Greeks, under Alexander, have the credit of first introducing wrought silk from Persia, about 323 years before Christ, though it would appear that the Phœnicians had already established its manufacture. It was not, however, until about A.D. 555 that the silk-worm was introduced, and a quantity of eggs was then brought from China by two monks. They received the encouragement of the Emperor Justinian, who for a period completely monopolised all the produce. These men appear to have used the knowledge they had gained in China successfully, and at once to have established the rearing of silk-worms, and the requisite processes of drawing off the silk, spinning, and working it, as one of the future employments of the western world. It was not long after this time that we find the manufacture established at Athens, Corinth, and Thebes; subsequently Venice became noted for its silk productions, and a large trade was carried on from that city with the Greek empire, and afterwards with the whole of the west of Europe. In Venice the silk manufacture was so highly esteemed that it was, in common with the glass trade and the manufacture and sale of drugs, considered fit occupation for the nobility of that proud city of the sea. From Venice the future trade of Italy in the raw material and the development of its manufacture passed into Lombardy, Flanders, France, and England. The Sicilians and Calabrians, too, did very much for the progress of this new art, since they brought workmen as prisoners or slaves from Athens and Corinth, after the plunder of those cities by Roger II., who, during his expedition to the Holy Land, undertook a little business on his own account in the subjection of these two cities and the spoliation of their manufactures; and when he returned home endeavoured to make the best use of the information and materials he had obtained. At length the whole of Italy, Spain, and eventually France under Francis I., gained sufficient knowledge to imitate the Sicilians and Venetians. In Spain the Moors appear to have attended to the production of raw silk and its subsequent manufacture with great skill and energy; and Granada and Cordova are said to have progressed wonderfully in this respect. In Granada the silk manufactures were found in a most flourishing condition when that city was taken by Ferdinand in the latter part of the 15th century. We may almost realise to ourselves the beautiful tissues produced by these Moors, supposing that their means of production equalled their skill in design, since the decorations of their palaces evidence their powers in the latter point, which is of a character essentially textile. Indeed, it is generally thought that the real aim of the Moors in diapering their walls so profusely was, in reality, to give them the appearance of being hung with the rich fabrics of the East. Skilled workers as they were in almost everything else, we may readily believe that they worked well with their looms and their embroidery needles.

From Spain and Lombardy the manufacture found its way to Flanders, or probably it arose there simultaneously with the other western portions of the continent of Europe, and thence it came to England. There was, however, a company of silkwomen in London as early as 1455; but these would appear to have been employed in works executed by the needle, either by sewing on some other material or by knitting; such goods being those which are now called small wares. It was, however, from Italy that all broad silks were brought to this country until the end of the 15th century. The silkwomen of London obtained the privilege of a protection act in 1454 for their small wares, against the importation of certain foreign articles for five years. In 1463 this protection was further extended to other articles, such as "laces, ribands, and fringes of silk, silk twined, silk embroidery, tires of silk, purses, and girdles." In 1482 this act expired, and as the makers of silk goods were speedily thrown out of employment, four years more were given them. Twenty-two years later certain goods were still restricted, whilst all raw materials were left free, together with such goods as the English did not know how to manufacture; for it was not until the latter end of the reign of James I. that the manufacture of broad silks had a fair start, and then in 1629 the silk-throwsters of London were incorporated under the style and title of "master, wardens, assistants, and commonalty of silk-throwsters."

War and religious persecution, as carried out by our continental neighbours, really laid the foundation of the silk trade in England, and subsequently tended to support and develope it. The Duke of Parma having taken Antwerp in 1585, exercised his right as conqueror and governor of the Spanish Netherlands, to give up that city to three days' plunder and destruction. The result was, that all fled who could do so, many with nothing for the future but their skill in manufactures. It is stated that a third part of the merchants and workmen engaged in the silk trade fled to England, and there finally settled, whilst the commerce of the Low Countries and the manufactures of Flanders and Brabant became almost extinct. The manufacture of broad silks and the richer tissues may date from this period, since it had now gained a footing in a practical sense, and soon obtained the occasional patronage of royalty, and the still more stringent support of protection acts of Parliament—two modes of progressing trade to which there is still a strong hereditary leaning to this day existent in Spitalfields. Even at this early period, when the trade could have scarcely got a more firm and extended footing in France than it had in this

country, except that the French had already solved the problem of growing their own silk, complaints were made of the fashions tending to the encouragement of the foreigner; for it was stated, as matter of grave moment, that "the women's hats were trimmed with hoods made of French silk, whereby every maid-servant became a standing revenue to the French king of one-half her wages." Perhaps the silk hoods of this and subsequent periods were the origin of the modern lady's bonnet.

(To be continued.)

Ancient Timber Framing.

By Ralph Brandon, Esq.

(Continued and concluded from page 16.)

We will now proceed to the more pleasing task of describing constructions where sound sense and legitimate ornamentation had guided the architect.

I can bring to your notice no examples of timber houses earlier than the fourteenth century; nor do I think it probable, owing to the perishable nature of the material, that any of an earlier date, in a perfect state as to their original design, are to be met with.

M. Viollet le Duc, in his admirable and most useful work, now issuing from the press, describes, as follows, a small house of this period, which was in existence about three years ago, opposite the south façade of the cathedral at Chartres:—

"The timber-framing, which is only one floor high, commences at the one-pair storey, the construction underneath being of rubble stonework, strengthened under the bearings by piers of solid dressed stone. On these are placed the beams which support the floor joists; these beams extend to the outer face of the wall, and on their extremities are placed the sills, into which are framed the principal posts directly over the beams. Between these principal posts smaller ones rise from the sill, and are framed into a head, which is tenoned into the principal posts. These posts serve as the divisions of the windows, the heads of which are formed by trefoiled-curved braces, and the whole framework is further strengthened by the window-sills and the cross braces beneath them. Into the head are framed posts, lineable with those below them, supporting the plate on which the roof rests. This plate is, as was usually the case, a double-framed one; the outer plate, which carries the secondary rafters, is placed on the ends of the beams, which rest on the principal posts, and, projecting beyond them, are supported by brackets. These beams serve as the beams to the roof, and also carry the ceiling joists. The inner plate, which is well supported by the posts, receives the feet of the main rafters of the roof. The spaces between the framing, not reserved for light, are filled in with light masonry."

When a house of several storeys was built entirely of timber, it was the usual custom for each of the upper storeys to overhang the one below it; the general reason assigned for this has been that in towns, which in those days were always surrounded by walls, space was too valuable to be lost, and therefore that which was necessarily given up for the streets was sought to be recovered by increasing the size of each floor as the house rose, by thus overhanging the storeys. I am not at all inclined to agree with this explanation, because houses without the walls were so erected. It is true that the custom of town building may have been followed as the population gradually spread over the land, but I think that the necessary requirements of the material are more likely to have suggested the practice. The reasons that I think induced the builders to overhang their storeys are, that if the same beam, into which the lower posts were framed, was mortised to receive the feet of the upper ones, it would have been too much weakened by all the mortise holes. A second beam was therefore employed, which might certainly have been placed directly over the first one, which served as a head to the lower framing, but by projecting it over, as was the custom, they formed a good protection from the weather for the framework below.

It would be for this same reason that the gabled fronts of these timber houses were always made to project over the face of the upper storey.

In the decoration of these framings the same breadth of treatment is discernible as that which regulated the architects of the period in their stone buildings. The edges of the different timbers were chamfered, carved, or moulded, according as the artist required to employ more or less richness in his design. But these mouldings always receded from the general face of the structure in which they occurred, the only exception being that here and there, as under the windows, a small piece of timber would be framed, projecting slightly, and moulded after the manner of a string-course to throw off the wet.

The Study of Botany.

By RICHARD REDGRAVE, A.R.A.

The source from which everything new in ornament is to be derived, as everything new in art also, is not to be found in ornament or in art, but in the boundless stores of nature, which are still (as they have ever been) open for the inspiration of those who seek for it through her.

The supply of objects for study, of motives for new ideas, which this one realm of nature—the vegetable kingdom—offers, is inexhaustible. Linnæus, about the year 1730, commenced his labours to form an artificial system for the arrangement of plants into orders and classes, to obviate the confusion into which, from the great accession of plants, botanical science had fallen. There were then about seven thousand known species. Since that time they have rapidly accumulated, partly from the attention awakened by the fame of his labours and other concurring causes, such as the energetic efforts in geographical discovery on every part of the earth's surface, and the encouragement of Government connected with those efforts in the search for the vegetable productions of other realms. Much also has been done by the labours of learned societies, and even by the enterprise of individuals, so that the number of known species has since that time multiplied twelve-fold, and is supposed to amount at present to between eighty and ninety thousand; to which, moreover, accessions are daily made from the same influencing causes. One

order—that of the *Asteraceæ*, or composites (plants whose flowers are composed of numerous flowerets on a common disc, as the dandelion, camomile, chrysanthemum, groundsel, lettuce)—is said to contain more species than the whole of the plants known to Linnæus. De Candolle speaks of 8,523 species in this order, while another French botanist in 1825 states them at 9,500.

It is true that this extensive list ranges from the outworks of vegetable life—the conferva and sea-wracks, the slime engendered in seas, pools, and rivers—through the brittleworts and lichens that coat the rocks, and the mosses that vegetate upon the trunks of trees, to those mighty giants of vegetation, the trees themselves. But, if the former class have little to offer to the attention of the ornamentist, it must be remembered that these ninety thousand species contain numberless varieties, and that the individuals of species and of varieties are in themselves sources of infinite and never-ending study. For each of these individual plants, although botanically identical, has a different growth from every other individual, and offers in the conditions of its life, to him who goes to nature for his models, a separate study of form and arrangement; nay, more, so infinite is nature's variety, that no two leaves on the same plant are perfectly identical in form, nor even the two sides of any one leaf.

But the subject extends still further. Not only is there a study in the foliage of many species, but in the blossoming, which may most truly be said to be nature's ornament; for while the leaves have their delicate textures fitted for the purposes required of them as organs of respiration, and for adapting the juices received by the root as food for the plant, the gaily-coloured petals of their flowers are an added beauty, whose purpose in the economy of the plant is less specifically recognised, but may, without impropriety, be considered as given by the Great Creator for the especial gratification of our sense and love of the beautiful.

The study to be found in an individual plant does not, however, end even here, for there is doubtless the beauty of decay. The fading hues of vegetation are often not less lovely than the full vigour of growth. He that studies the decay of vegetation will become sensible of the wonderful harmony through which the tints of the various parts pass in their passage to death. The leaf and its footstalk, often beautifully contrasted in their vigour, are differently, yet not less harmoniously, contrasted in their decay. The fruit of plants, as it ripens, harmonises with the fading foliage, and becomes a new source of beauty when the flowers have passed away. And, when all the ornament of nature fails, the bony structure of the stems, which supported that vegetation, but resting awhile to rise in renewed beauty with the renewing year, forms another source of study, and is worthy of great attention from its wonderful union of elegance with strength and utility.

If, therefore, we deduct from the above astounding list of species all those microscopic productions which are too minute to interest the ornamentist, and those vegetables of low organisation which offer little for his consideration, still, when those that remain, or even that small portion of them which may or can come within his observation, are multiplied by all the sources of variety arising from individuality of growth of parts, and of periods of vegetation, the sum will indeed be infinite, and may well recall us from mere reconstruction of the parts of conventional ornament to those newer forms and combinations which such a study of nature must assuredly suggest.

Technicologia.

178. *Colours for Tinting Glass.*—Blue or blaves colour: cobalt or ultramarine, with purified crystal glass. Emerald colour: from oxide of copper and yellow oxide of iron. Ruby colour: from tartar, copper, and iron, or carbonate of potash and yellow oxide of iron. Carbuncle: gold calcined, 1; carbonate of potash, 2. Sapphire: blue bicarbonate of copper, or ultramarine, 1; potash, 2. Jacinth: protoxide of gold, ½ part; ground iron, ½ part; potash, 1. Emerald: red oxide of copper, a little; potash, 2. Topaz: protoxide of lead; protoxide of gold, a little; potash, 2. Garnet: protoxide of gold; hæmatite, a little; potash, 2. Chrysolite: oxide of zinc, 1; potash, 2. Turquoise: protoxide of gold, ½; blue bicarbonate of copper (*lapis armenus*); potash, 2. Carnelian: oxide of tin, ½; potash, 2; golden marcasite, ½; oak ashes, ½ part. Sapphire: 1 lb. finely ground crystal; ½lb. calcined stage' bones; ½lb. carbonate of potash; melt it, and afterwards place ultramarine blue. (This glass would be opaque.) Flux: nitrate, or bitartrate of potash and borax, equal quantities, with ceruse: mix with oil of eggs into a paste: or, crystal calcined, 1; carbonate of potash, 2: or, crystal and oil of tartar fused together, and add nitre: or, glass well burnt, powdered, and washed, and melted with an equal quantity of borax.

Appreciation of Architecture.

Were we to reason from the amount of attention paid to the characteristics of every style, the number of excellent publications relating to architecture, and the copiousness of engravings and lithographs, or were we to accept the congratulatory paragraphs of the newspapers, we might perhaps be led to disregard the fact, that the knowledge of the true Art is still discordant with the character of a people of high civilisation, and that the conviction and perception of its real beauties is as much a blank as would be the absence of a sense. The pursuit of archæology is popular, graphic illustrations of buildings are widely disseminated, the ready use of the pencil is not confined to architects; but still, the power to recognise the beauties of art in architecture, and the feeling of the important "mission" of art universal, have no real existence. The want of any national recognition of the high educational value, and of the humanising and purifying influence of that art—the ignorance of this value, and of everything that relates to art, and especially of what relates to architecture, displayed in Parliament whenever these matters are touched upon, is most melancholy to those who believe in something which transcends even that "mercantile value" which we are slowly appreciating—a value infinite and pervading, and beyond what is dreamed of in all the philosophy of Oxford and Cambridge. The anomalous condition of educational institutions in which some knowledge of architecture is not conveyed to future legislators may, we hope, be thought worthy to enter into the consideration of those who are endeavouring to reform abuses in these ancient seats of learning; places which, whatever the prospective tendency of thought which we would inculcate, will, in the eyes of the architect, always appear tinged with the colour of antiquity, and will have interest as the local depositories of works of merit in the sister arts, and for their fine examples of architecture—which stand in anomalous contrast to the condition of

real art generally in those universities. For, it is important that we should not confound knowledge of antiquarian remains, or the power to appreciate *drawings* and illustrations of works of art, or the knowledge of dates and the characteristics of styles, or the ability to imitate them, with real art. Much as we should have differed from Mr. Kerr in the limitation of the term "architecture," and of the vocation of the architect, which his able and amusing work would seem to inculcate, we yet entirely recognise the importance of a correct view of the nature of art, and shall at all times support this with whatever weight of argument we can command.

True art, although difficult to define, is both distinct from and inclusive of the subjects of attention which are mistaken for it. The architect is, of all, the last who should disregard the value of researches into the condition of art at particular periods.

But he is also the last who should sink under the influence of routine. He should be open, at all times, to the consideration of premises, dissimilar and opposite to previous ones. He may learn much by analogy, from examples; but mere antiquarianism is "a snare." It is not necessary that he "should enter into the spirit of a style," in the sense in which this phrase is, we fear, often intended to be understood, and which would fall short of what is required. It might be well if he entered into the spirit of an old style, with the object of contrasting it with other styles, and to give birth to a new spirit and a new style. But there are certain principles which are unvarying, whatever the changes in styles, and *these* we ought to grasp. Studying with any other object, we become unworthy of the name of artists. Fashions take the place of settled principles: we exalt indifferent works of the prevailing fashion, and unjustly depreciate works, only because they are of the style which we have discarded.

English Silk.

The value attached to all articles of manufactured silk, and the large sums yearly paid by the merchants and manufacturers of this country for the raw material, have led to repeated attempts at its culture in England, and although the origin of the silk-worm is connected with the sunny regions of the East, and its rearing has been carried to such perfection in the congenial soil of Piedmont, yet facts generally seem to indicate the possibility of its addition to the products of England.

The story of two Nestorian monks of Persia who volunteered its introduction into the dominions of the Emperor Justinian, and the concealment of the eggs in their bamboo canes, has thrown an air of romance over the first appearance of this insect within the confines of Europe. With this introduction the monks brought the still more useful knowledge of the art of manufacturing the silk into articles of custom and luxury; and this branch of trade has since become a source of employment to the inhabitants of Italy as well as of wealth to her merchants.

From such an insignificant source sprang the export in silk, which amounted in 1849 to *two hundred and forty-one thousand forty-eight pounds* to this country alone.

During the reign of James I. an attempt was made in this country to propagate the silk-worm, and in order to render our soil conducive to its production, circular letters were addressed to all persons of influence to rear mulberry-trees. How generally this order was obeyed is attested by their existence to the present day in the grounds which surround the mansions of that date. This experiment, however, proved unsuccessful, and attempts were then made to introduce the silk-worm into our Transatlantic settlements, but the high rate of wages rendered the enterprise equally unfortunate.

In 1718 a company was formed which obtained the lease of Chelsea Park for 120 years, where mulberry-trees were extensively planted, and buildings erected to facilitate the rearing the silk-worm.

In 1824 another company commenced operations under the presidency of Mr. Huskisson, and for the information of the public a treatise by an Italian nobleman, Count Dandolo, on the silk-worm, was circulated under its auspices.

A similar attempt was recently made in Norwich by a few of its operatives, one of whom had just returned from Piedmont, where he had obtained an insight into the culture of the worm and the winding of its silk. Considerable progress was made in this experiment, and some of the silk was sold to the Norwich merchants; but owing to the scarcity of mulberry-trees in this neighbourhood the effort proved abortive.

The exertions of Mrs. Whitby of Newlands, near Lymington, have proved more successful. The reasons which induced this lamented lady to undertake the culture of the silk-worm in England are detailed in the following account, presented by her to the Royal Agricultural Society of England. Mrs. Whitby says:—

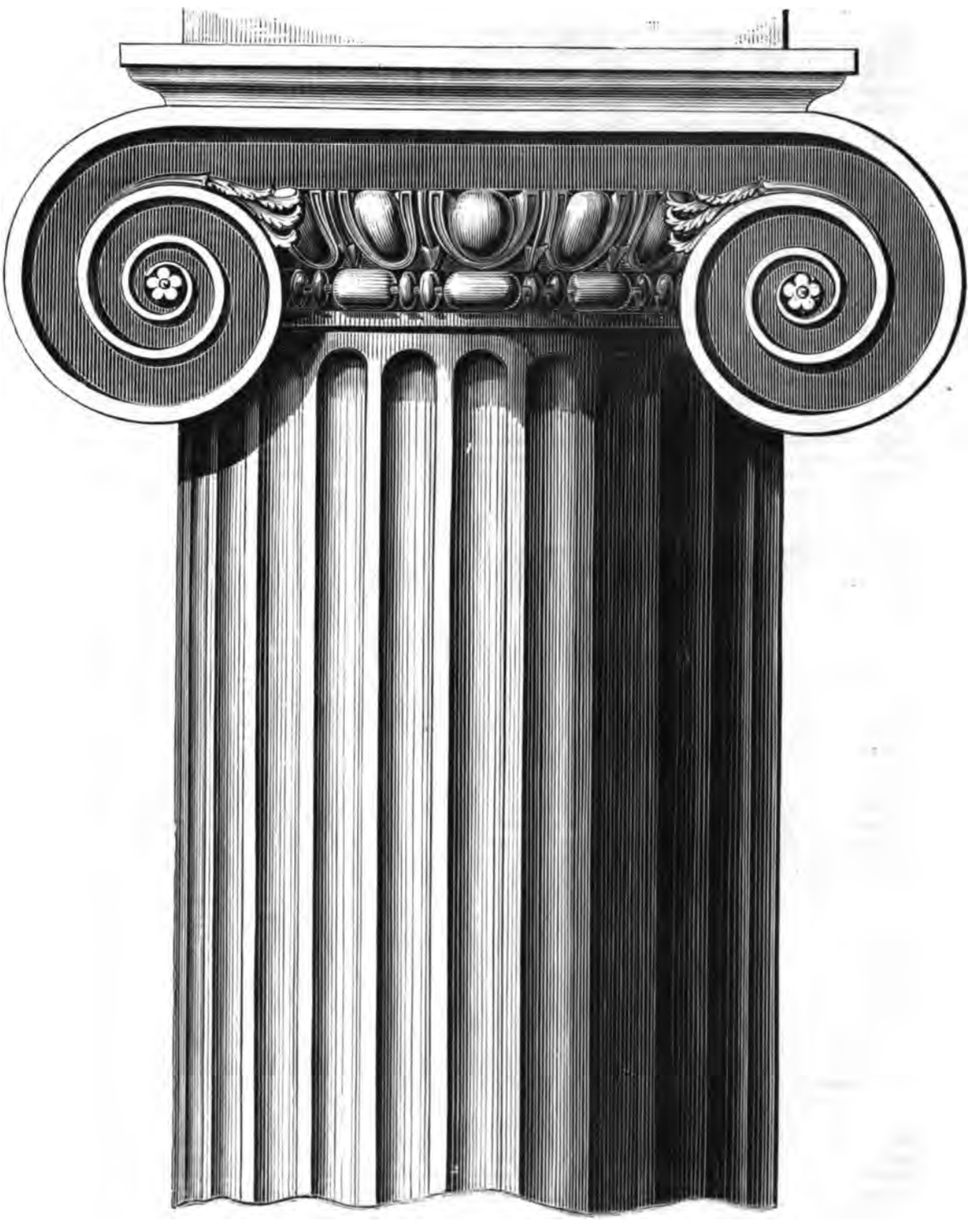
"I was led to the undertaking by hearing in 1835, whilst I was travelling in the north of Italy, of an English gentleman who had doubled his capital in three years, and who received 10 per cent. on that laid out on a silk establishment, near Milan, and wonder was expressed that the culture had not been tried in England, and it was difficult to find profitable work for the labourer. I determined to try to introduce the cultivation of silk. I saw the young mulberry-trees in Lombardy blown aside by the force of the north-east winds as our forest trees are here by the south-west gales. At this period a fog of thirty-three days' duration had prevailed, and the ground round Milan was covered with snow and iron-bound with frost. I knew that around Florence the nights were cold and the weather uncertain, even as late in the spring as the 1st of June.

"Judging from all this that the climate of England was equally favourable to the growth of the mulberry, I ordered from a nursery-garden at Turin 100 standard trees and 1000 dwarf mulberry plants of the sort called 'Of the Philippine Islands.' This sort produces much larger leaves than the Italian wild white mulberry, or that which in England is cultivated for its fruit. Its growth is rapid, and it is easily propagated by cuttings, which strike as readily as the willow.

"My plants did not arrive in England until April, 1836. I treated them according to the directions given in Mons. Burdin's book, and I did not lose one. I even gathered leaves from them the same year. I bought half an ounce of silk-worms' eggs at Novi, which is said to produce the best silk in Italy, and thus laid the foundation of a small establishment, which I hope will be the means of spreading the culture of raw silk throughout England and in the course of years render her independent of foreign resources in this article."

We trust that the culture of the silk-worm in England will not again decline with the death of this philanthropic lady; well-directed individual enterprise having often achieved that which a greater combination of talent and capital has failed to accomplish.

ALPHABET (OLD ENGLISH)



ROMAN IONIC.

Silk Manufacture.

(*Continued from page* 18.)

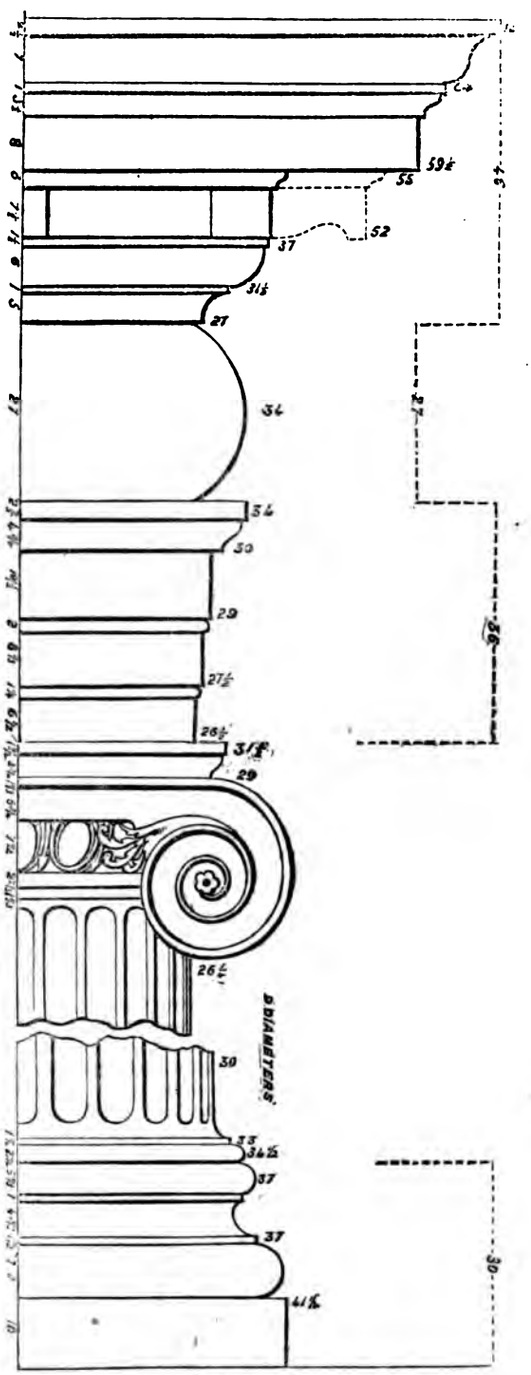
THERE is, however, another department of the silk trade, which was at one period of a highly ornamental character, and which had much to do with its earliest progress in this country: we allude to the stocking trade. Silk stockings were once considered as acceptable presents for kings and queens. Howell says that Queen Elizabeth was highly delighted at being presented with a pair of knit black silk stockings by her silk-woman, Mrs. Montague. Her father, Henry VIII., got his silk hose for gala-days from Spain; and Sir Thomas Gresham presented Edward VI. with a pair of long Spanish stockings as something worthy of his royal notice. The invention of the stocking-frame by William Lee, a poor student of St. John's College, Cambridge, appears to have given the first decided stimulus to the silk trade, on anything approaching to a large scale; for in addition to its having the effect of causing the abandonment of the clumsy woollen hose of the period, and rapidly replacing them with a light and elegant fabric at a comparatively low cost to the wealthy, the stocking-frame so increased and cheapened production as eventually to cause the establishment of a regular trade with the Continent, particularly with Italy, whence the raw material was obtained in exchange for the manufactured goods: and Keysler, in his "Travels through Europe," as recently as 1730, says that "at Naples, when a tradesman would highly recommend his silk stockings, he protests they are right English;" and of course his contemporary on the banks of the Thames also protested that the goods made by the same machine and at the same time in the little English town of Leicester, were "right French." To a certain extent, probably, both were true, for Lee, the Englishman, found so little encouragement in his own country, that he went over to France on the invitation of Henry IV., and, taking with him a number of workmen, established himself at Rouen. He met the fate of many another inventor, and died in poverty at Paris, having been compelled to abandon his establishment at Rouen, in consequence of the internal troubles of France, arising out of the assassination of his patron. The silk stocking trade, however, subsequently rose again, for though Lee's workmen are generally supposed to have returned, and eventually established the stocking-frame in England, still sufficient knowledge had been gained by the French to enable them to carry on the trade when better times came. Thus we see, that though England manufactured silk hose for the Continent for a long period, she rarely had the credit of doing so at home; and though it is well known that silk hose were made in France and brought to England, there is little doubt that the early reputation of French silk stockings was about as great a verity as very many other articles which our neighbours have had the credit of doing better than ourselves. That we are largely indebted, however, to the skill and energy of the French in the working out of the silk trade in the first instance, and to their suicidal policy subsequently, for its full and fair establishment in this country, must ever be borne in mind; and such being the case, a glance at its progress in France may be valuable as a key to its final development in England.

Louis XI. established workmen at Tours in 1480. These came from Florence, Genoa, and Venice, and he conferred upon them extensive privileges. About 1520, at which time Milan was in the hands of the French under Francis I., artisans were sent from that city to Lyons, where they introduced their art with great success, under the liberal treatment and fostering care of the king. For a long period, however, they had many difficulties to contend with, and their productions were completely confined to the home market, and in all probability almost to the court itself. They certainly exported nothing, and it was not until the reign of Henry IV. that the full natural resources of the country were brought out in the production of raw silk, to which Henry paid great attention. It would appear that, in 1564, a common gardener at Nismes, named Traucat, first succeeded in the cultivation of the white mulberry-tree, which in a few years was propagated all over the south of France. Through the encouragement of Henry, silk-worms became naturalised as far north as Orleans, and he even attempted to breed them at the Tuileries and Fontainebleau, and planted mulberry-trees for that purpose. Subsequently, that enlightened minister, Colbert, gave every encouragement to the cultivation of the mulberry-tree as the basis whereon the silk trade of France was to be established; and after trying various methods, with more or less success, by which to stimulate the peasantry and landed proprietors, a reward of three livres was given to the cultivator of every tree found in good condition three years after it had been planted. Provence, Languedoc, Dauphiné, Vivarais, Lyonnais, Gascony, and Santonge, became quickly covered with these trees, though the rearing of the silk-worm is chiefly confined to the four first-named provinces. A rapid progress soon marked the manufacture of this raw material, and wise provisions were thus made for its supply almost upon the spot where it was to assume the beautiful forms of the silks of Lyons and Tours. This was soon evidenced by the extraordinary growth of manufacturing means, until at length Lyons is said to have had 18,000 looms at work in its highest state of prosperity prior to the revocation of the Edict of Nantes in 1685,—a fatal measure for the silk trade of France, as in 1698 Lyons had only 4,000 looms in operation. At Tours we find a similar result arising out of like causes, for at one time there were 800 hand-mills for winding and preparing silk, 8,000 looms employed in the weaving of that silk, and 40,000 persons engaged in the manufacture. After the fatal act on the part of Louis XIV., above named, the reduction was fearful; the mills were brought down to 70, the looms to 1,200, and only 4,000 persons found employment in the silk trade of Tours. Such was the immediate result of the intolerant policy of the *grand monarque*. France lost nearly all she had gained through the energy and foresight of Colbert, and her best and most ingenious citizens were distributed through the free states of Europe—England, Switzerland, Holland, and Germany benefiting largely thereby. In the ultimate result of the revocation of an edict which protected the Protestant workers of France we are largely interested, and it will be seen to what we are to attribute the complete establishment of the silk trade in this country. It may

not be uninteresting, however, to shew that very laudable efforts were made, not only to encourage the manufacture of silk, but to raise the raw material at our own doors through attention to the rearing of the silk-worm. In consequence of the information he received of the success of the efforts above related, in France, our James I. evinced great anxiety to promote the introduction of silk-culture into this country, and in 1608, two years before the unfortunate death of Henry IV. of France, he issued circular letters to all the counties of England, directing persons to whom these letters were addressed to use their influence in quarter sessions and public meetings to persuade and require all persons who were able, to purchase plants of mulberry-trees, to be had at a given place in London at three farthings each; and notwithstanding much apathy, the royal sanction had its weight, and probably caused more to be done than at first sight appeared likely, for most of the old mulberry-trees now to be found near the mansions of that period, were planted at this time, in accordance with this circular letter of James. Nothing, however, resulted so far as regards the rearing of the silk-worm, for it was soon found that the climate was unsuitable, and the habits of the peasantry even more so, since more modern experiments have shewn that much might be done with care and attention. The colonies, too, and perhaps with more reason than the parent country, shared the anxiety of the king in his desire to promote the growth of silk, and the settlements in America received much encouragement. Even royal patronage, however, could not remove the apathy of the people in this matter, and little or nothing was done, though it was not unreasonable to suppose that in a newly-cultivated and peopled country much could have been achieved; but again the habits of the people interfered; the employment was of too sedentary a character for the "go-ahead" ancestors of the modern Yankee, and eventually cotton took the place of King James's pets, the cocoon, chrysalis, and moth of the *bombyx*, together with that object of his solicitude, the mulberry-tree. At home, however, sanguine individuals were found to keep the question moving, and more than a century after James, a company was formed, and Chelsea Park taken on a lease for one hundred and twenty-two years, and largely planted with mulberry-trees; buildings, too, were erected for the propagation of the silk-worm, and the business was now to be done in the throwing of a shuttle. But like many other well-laid "schemes of mice and men," this failed too; no large supplies were ever raised, and the ultimate result we have already shewn. In short, the social condition of the people, apart from the uncertainty of climate, was against the scheme; and this applied with equal force in the colonies as at home. In the south of France all these conditions were in favour of the rearing of the silk-worm, and expectations as to wages were constantly kept down at a minimum. The colonies of Virginia, Georgia, and Carolina, appear to have been the most successful of the British possessions, and in 1749 an act was passed to exempt from duty all silk imported from Georgia and Carolina into the port of London; but before the close of the eighteenth century the cultivation was completely abandoned in Georgia, and that of cotton, a more certain and more profitable staple, adopted instead.

(To be continued.)

The Five Orders.



IONIC COLUMN—PALLADIO.

Technicologia.

179. *Ink.*—Every liquor or pigment used for writing or printing, is distinguished by the name of ink. Of black ink there are three principal kinds: 1. Indian ink; 2. Printers' ink; and 3. Writing ink. The Indian ink is used in China for writing with a brush, and for painting upon the soft flexible paper of Chinese manufacture. It is ascertained, as well from experiment as from information, that the cakes of this ink are made of lampblack and size, or animal glue, with the addition of perfumes or other substances not essential to its quality as an ink. It is used in Europe for designs in black and white, in which it possesses the advantage of affording various depths of shade, according to its state of dilution with water. The coarse lampblack of the shops will not answer the purpose; but the fine soot from the flame of a lamp or candle, received by holding a plate over it, mixed with clean size from shreds of parchment or glove-leather not dyed, will make an ink equal to that imported.

The general composition of printers' ink is well known, but the particulars of the process by which ink of the best quality is made are kept secret by the manufacturers of this article.

Good printers' ink is a black paint, smooth and uniform in its composition, of a firm black colour, and possesses a singular aptitude to adhere to paper thoroughly impregnated with moisture. It is remarkable that this composition adheres uniformly to the surface of the printing roller; that it quits the roller to adhere to the face of the metallic type, and this so perfectly as to leave a bare surface where the type touches it; and that much the greater part of the ink afterwards leaves the type to adhere to the moistened paper, but will not if the paper be dry. If the ink do not possess these requisites, it will not work well, but will clog the face of the letter, and give an imperfect impression.

The consistence and tenacity in the oil in this composition are greatly increased, and its greasiness diminished, by means of fire. Linseed oil or nut oil is made choice of for this use. The nut oil is supposed to be the best, and is accordingly preferred for the black ink, though the darker colour it acquires from the fire renders it less fit for the red. It is said that the other expressed oils cannot be sufficiently freed from their unctuous quality; whence the ink made with them dries exceeding slowly, is apt to come off and smear the paper in the pressing it undergoes in the hands of the bookbinder, or sinks into the substance of the paper beyond the mark of the type, and stains it yellow.

Ten or twelve gallons of the oil are set over the fire in an iron pot, capable of holding at least half as much more; for the oil swells up greatly, and its boiling over into the fire would be very dangerous. When it boils it is kept stirring with an iron ladle; and if it do not itself take fire, it is kindled with a piece of flaming paper or wood; for simple boiling, without the actual accension of the oil, does not communicate a sufficient degree of the drying quality required. The oil is suffered to burn for half an hour or more, and the flame being then extinguished by covering the vessel close, the boiling is afterward continued with a gentle heat, till the oil appears of a proper consistence; in which state it is called varnish. It is necessary to have two kinds of this varnish, a thicker and a thinner, from the greater or less boiling, to be occasionally mixed together, as different purposes may require; that which answers well in hot weather being too thick in cold, and large characters not requiring so stiff an ink as small ones.

The thickest varnish when cold may be drawn into threads like weak glue; by which criterion the workmen judge of the due boiling, small quantities being from time to time taken out and dropped upon a tile for this purpose. It is very viscid and tenacious, like the soft resinous juices, or thick turpentine. Neither water nor alcohol dissolves it; but it readily enough mingles with fresh oil, and unites with mucilages into a mass diffusible in water in an emulsive form. Boiling with caustic alkali produces a soapy compound. It is by washing with hot soap-lees and a brush that the printers clean their types. The oil loses from one-tenth to one-eighth of its weight by the boiling into the thick varnish. This loss seems to differ in different samples of the same kind of oil. Dr. Lewis found that fish oil lost three-fourths of its weight by this treatment, before it acquired the thickness produced in linseed oil.

Turpentine or litharge is occasionally used. The turpentine is boiled first by itself to a state nearly of resin, and the oil being taken from the fire, the hot fluid turpentine is poured in, and the boiling then continued to the proper point. This is somewhat difficult to attain, because the mixture is more disposed to grow too thick if overboiled, and is full of little hard grains, probably of resin, if not sufficiently boiled. It is affirmed that varnish, containing either turpentine or litharge, particularly the latter, is more adhesive than other varnish, and presents a great difficulty in cleaning the types, which soon become clogged. Very old oil requires neither of these additions. New oil can hardly be brought into a proper state for drying, so as not to set off, without the use of turpentine.

Lampblack is the common material to give the black colour, of which two ounces and a half are sufficient for sixteen ounces of the varnish. Vermilion is a good red. They are ground together on a stone with a muller, in the same manner as oil paints.

The ink used by copper-plate printers differs in the oil, which is not so much boiled as to acquire the adhesive quality. This would render it less disposed to enter the cavities of the engraving, and more difficult either to be spread or wiped off. The black is likewise of a different kind. Instead of lampblack, or sublimed charcoal, the Frankfort black is used, which is a residual or denser charcoal, said to be made from vine-twigs. This is softer and less gritty than the ivory or other blacks prepared among us, and no doubt contains more coal than any animal residue, as all these abound with phosphate of lime. It is said that lampblack gives always a degree of toughness to the ink, which the Frankfort black does not; but the goodness of the colour seems to be the leading inducement for the use of the latter. A pale or brown black can be much more easily endured in a book than in the impression of an engraving.

Common ink for writing is made by adding an infusion or decoction of the nut gall to sulphate of iron, dissolved in water. A very fine black precipitate is thrown down, the speedy subsidence of which is prevented by the addition of a proper quantity of gum arabic. This is usually accounted for by the superior affinity of the gallic acid, which, combining with the iron, takes it from the sulphuric, and falls down. But it appears as if this were not the simple state of the facts; for the sulphuric acid in ink is not so far disengaged as to act speedily upon fresh iron, or give other manifestations of its presence in an uncombined state.

According to Deyeux, the iron in ink is partly in the state of a gallate, partly in that of a carburetted oxide.

Mr. Ribaucourt paid particular attention to the process for making black ink, and from his experiments he draws the following inferences:—That logwood is a useful ingredient in ink, because its colouring matter is disposed to unite with the oxide of iron, and renders it not only of a very dark colour, but less capable of change from the action of acids, or of the air. Sulphate of copper in a certain proportion gives depth and firmness to the colour of the ink. Gum arabic, or any other pure gum, is of service, by retarding the precipitation of the feculæ; by preventing the ink from spreading or sinking into the paper; and by affording it a kind of compact varnish, or defence from the air, when dry. Sugar appears to have some bad qualities, but is of use in giving a degree of fluidity to the ink, which permits the dose of gum to be enlarged beyond what the ink would bear without it. Water is the best solvent.

Lewis had supposed that the defects of ink arise chiefly from a want of colouring matter. But the theory, grounded on the facts discovered by Mr. Ribaucourt, requires that none of the principles should be in excess. If there be a want of the gallic acid, part of the sulphate will not be decomposed; if, on the contrary, there be too much, the sulphate will take as much as it can decompose, and the remainder will be nearly in the state of the decoction of galls, subject to change by becoming mouldy, or to undergo an alteration after writing, which destroys its legibility much more completely than the change undergone by ink containing too small a proportion of the galls.

It is doubtful whether the principles of the galls be well extracted by maceration; and it is certain, that inks made in this way flow pale from the pen, and are not of so deep a black as those wherein strong boiling is recurred to.

From all the foregoing considerations Mr. R. gives these directions for the composition of good ink:—

Take eight ounces of Aleppo galls (in coarse powder); four ounces of logwood (in thin chips); four ounces of sulphate of iron; three ounces of gum arabic (in powder); one ounce of sulphate of copper; and one ounce of sugar candy. Boil the galls and logwood together in twelve pounds of water for one hour, or till half the liquid has evaporated. Strain the decoction through a hair sieve, or linen cloth, and then add the other ingredients. Stir the mixture till the whole is dissolved, more especially the gum; after which leave it to subside for twenty-four hours. Then decant the ink, and preserve it in bottles of glass or stoneware, well corked.

Inks of other colours may be made from a strong decoction of the ingredients used in dyeing, mixed with a little alum and gum arabic. For example, a strong decoction of Brazil wood, with as much alum as it can dissolve, and a little gum, forms a good red ink. These processes consist in forming a lake, and retarding its precipitation by the gum.

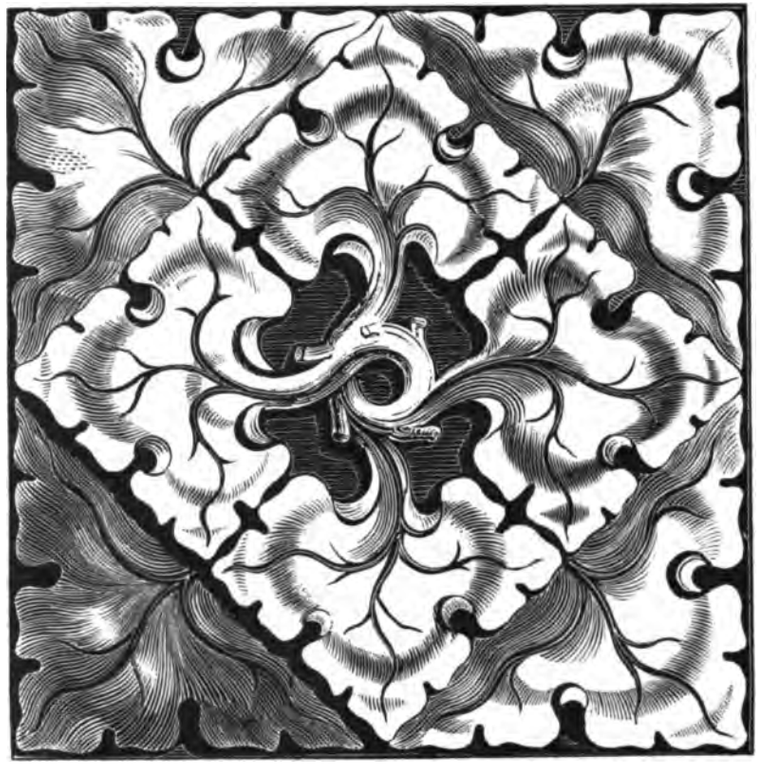
On many occasions it is of importance to employ an ink indestructible by any process, that will not equally destroy the material on which it is applied. Mr. Close has recommended for this purpose 25 grains of copal, in powder, dissolved in 200 grains of oil of lavender, by the assistance of gentle heat, and then mixed with 2½ grains of lampblack and half a grain of indigo; or 120 grains of oil of lavender, 17 grains of copal, and 60 grains of vermilion. A little oil of lavender or of turpentine may be added, if the ink be found too thick. Mr. Sheldrake suggests that a mixture of genuine asphaltum dissolved in oil of turpentine, amber varnish, and lampblack, would be still superior.

When writing with common ink has been effaced by means of oxygenised muriatic acid, the vapour of sulphuret of ammonia, or immersion in water impregnated with this sulphuret, will render it again legible. Or if the paper that contained the writing be put into a weak solution of prussiate of potash, and when it is thoroughly wet a little sulphuric acid be added to the liquor, so as to render it slightly acidulous, the same purpose will be answered.

Mr. Haussman has given some compositions for marking pieces of cotton or linen, previous to their being bleached, which are capable of resisting every operation in the processes both of bleaching and dyeing, and consequently might be employed in marking linen for domestic purposes. One of these consists of asphaltum dissolved in about four parts of oil of turpentine, and with this is to be mixed lampblack, or black lead in fine powder, so as to make an ink of a proper consistence for printing with types. Another, the blackish sulphate left after expelling oxygen gas from oxide of manganese with a moderate heat being dissolved and filtered, the dark gray pasty oxide left on the filter is to be mixed with a very little solution of gum tragacanth, and the cloth marked with this is to be dipped in a solution of potash or soda, mild or caustic, in about ten parts of water.

Among the amusing experiments of the art of chymistry, the exhibition of sympathetic inks holds a distinguished place. With these the writing is invisible, until some reagent gives it opacity. We shall here mention a few out of the great number, that a slight acquaintance with chymistry may suggest to the student. 1. If a weak infusion of galls be used, the writing will be invisible till the paper be moistened with a weak solution of sulphate of iron. It then becomes black, because these ingredients form ink. 2. If paper be soaked in a weak infusion of galls, and dried, a pen dipped in the solution of sulphate of iron will write black on that paper, but colourless on any other paper. 3. The diluted solutions of gold, silver, or mercury remain colourless upon the paper, till exposed to the sun's light, which gives a dark colour to the oxides, and renders them visible. 4. Most of the acids or saline solutions being diluted, and used to write with, become visible by heating before the fire, which concentrates them, and assists their action on the paper. 5. Diluted prussiate of potash affords blue letters when wetted with the solution of sulphate of iron. 6. The solution of cobalt in aqua regia, when diluted, affords an ink which becomes green when held to the fire, but disappears again when suffered to cool. This has been used in fanciful drawings of trees, the green leaves of which appear when warm, and vanish again by cold. This effect has not been explained. If the heat be continued too long after the letters appear, it renders them permanent. 7. If oxide of cobalt be dissolved in acetous acid, and a little nitre added, the solution will exhibit a pale rose colour when heated, which disappears on cooling. 8. A solution of equal parts of sulphate of copper and muriate of ammonia gives a yellow colour when heated, that disappears when cold.

Sympathetic inks have been proposed as the instruments of secret correspondence. But they are of little use in this respect, because the properties change by a few days remaining on the paper; most of them have more or less of a tinge when thoroughly dry, and none of them resist the test of heating the paper till it begins to be scorched.



PATERAS (PERPENDICULAR GOTHIC).

CEILINGS ARABESQUE

Painted Glass.

By W. A. Sanford, Esq.

WHEN a painted window has to be executed, and the subject and price decided on, the designer prepares a cartoon of the exact size and shape of each light of the window; in which every line, every shadow, and every lead that is to occur in the glass is marked off, exactly the width and strength it is to be in the glass. When there is a repetition of pattern or border, of course it is not necessary to do more than a few examples of the repetition, unless the donor of the window wishes for a pattern, to judge of the effect of the whole; but every portion that differs in ever so small a degree from the rest, requires a separate design, unless the painter is capable, as he often is, of designing ornaments on the glass itself from hints given him by the designer; but in this case the designer and painter must thoroughly understand each other, so that the harmony of the whole may not be disturbed. When the cartoon is finished and coloured, the cutter takes it in hand, and traces from it, on a separate cartoon, every separate piece of glass that may occur in the composition, numbering and tracing to correspond with the tints in the drawing. This is done in order that the cartoon may not be unnecessarily scratched or injured in the operation now to be described. The designer having selected the tints from his colour-box, which he obtains by collecting from the different glass manufacturers all the tints and qualities of glass they make, and making small squares of each sort of glass, tells the cutter which tint to apply to each number. The cutter then, with a diamond, marks out the pieces of glass according to his tracing. He then cuts the glass with his diamond as near the shape of each tracing as it will break, and then with a pair of steel pliers, or with a grosing iron, pinches out in powder the glass to form the hollows in the pieces, and trims all the different pieces to fit. Of course this cannot be done in all cases, for a piece of glass cannot be hollowed out more than at a certain angle; in this case a lead must go across the piece, and it can be shown that this lead may be almost entirely hidden by a little management in a great number of cases; and even when seen, and carried boldly across a high light or along a deep shadow, it is, singularly enough, hardly visible in either case. When the glass is all cut, the painter then takes the different pieces and places them in the original cartoon one by one, and traces all the outlines in a thick dark brown, or nearly black enamel. When all is traced out, and corrected by the original designer, he places the pieces again on the cartoon, and shades them down with different brown enamels, according to the tint of the glass and the effect to be produced on each piece. Sometimes a cold enamel is required to shade a warm tint, or *vice versâ*. The knowledge of this part of the art is only learnt by considerable experience, and the best and most experienced men of the present day know little of it. At present the best practisers of the art coarsely stipple the glass by striking the wet enamel shading with the point of a stiff flat-headed brush. The reason of this will be given hereafter. The shadings are corrected by the designer by delicate touches and finishings. When yellow is required on white glass, it is put on by applying a preparation of silver to the opposite side of the glass, and then the whole, when dry, is ready for burning. This is the only transparent colour that can be placed on white glass, and is a stain, and not an enamel. It is generally, however, a poor tint when compared with the glass which is coloured all through in the manufacture, as well as being less certain in its application. This burning is conducted by placing the glass in a muffle—an iron box with a door. The glass may be packed in with lime, so that a layer of about half an inch of lime is between each layer of glass; or the glass may be placed on iron trays, which rest on ledges in the muffle. Both methods have their advantages, but the lime process is best for the coarser church and large window work, where coarseness of feature produces an absolute softness of effect, and the iron shelf method answers best for fine enamel work, which is intended to please near the eye. The muffle has small holes in the top; in them are inserted test pieces of glass, projecting about three or four inches. The fire is then lighted round the box, and continued until the test pieces begin to melt. The fire is then allowed slowly to decrease, and the muffle is allowed to cool for twelve or fourteen hours, in order to anneal the glass. When it is opened, and the glass examined, if all sufficiently burnt, and the enamel hard enough to bear the point of an ordinary penknife, it is cleaned, and leaded together on the tracing which was taken by the cutter. It may be leaded in more than one panel. The fastening wires are then placed in their proper places, and the window is fitted to the stonework, and the saddle-bars are put into the window, and it is then fastened to them with the wire, stopped in, and may or may not be an ornament to the place it is to occupy.

I said that yellow is the only transparent tint which can be applied to white glass; an artifice, however, exists by which other colours of great beauty may be apparently so applied. Glass is sometimes made in two thicknesses of white and coloured glass; it is then called flasked glass. If the coloured coating is ground off, the pictures which are left present a coloured pattern on a clear white ground; this may be shaded and stained yellow, so that we can get three distinct colours and the enamel shading on one piece, but the poor quality of the white thus obtained is a hindrance to the employment of this otherwise beautiful artifice.

This is a short sketch of that which in our younger days was called a lost art. That it is the same, substantially, that was practised in Europe from the twelfth to the sixteenth centuries, is known by the recovery of ancient manuscripts, which were long neglected from the seeming absurdity of the receipts for producing tints in the sheet glass.

In the old time the designer, cutter, painter, leader, and even the manufacturer, were often, and perhaps generally, the same person. The value of their old unscientific methods is now known to be based on strictly scientific principles, and the same principles are now used to produce the gorgeous rubies, and the more than sapphire and emerald hues which enrich and enliven our modern churches. At present, under the subdivision of labour which prevails in every department, it is more convenient to let the manufacturer produce and colour

the glass; particularly when manufacturers like Messrs. Powell, of Whitefriars, devote their great resources and energies to the production of glass which in every respect (save one) is equal, if not superior, to that we find in our old buildings. But it is an advantage that the designer and painter should be the same person, while the cutter and leader may be united, or the burner, cutter, leader, and painter may be the same; but it is rare to find a person who can do well the coarser work (cutting and leading) who has the requisite knowledge of art to design successfully.

I will now proceed to a sketch of the more remarkable peculiarities presented by the painted glass executed in the different periods of the Pointed style.

I believe the earliest examples known are those which accompany the earliest pointed windows, and are, therefore, probably of the twelfth century. The glass of this period is generally rough and thick, and often more than a quarter of an inch thick: it is in small pieces, so that a moderate sized head is often leaded across, from inability to obtain a piece of the proper colour of the proper size; that it has not been cracked by accident is shewn by the ancient marks of the grosing iron. The colours of the coloured portions are generally deep and glowing; the colour is seldom uniformly distributed over the glass. The ruby especially is streaky and mottled, but of a beautiful tint, and is made, when closely examined, in a manner totally different from any now used, and all attempts to imitate the structure have failed. It is in thin laminæ, sometimes more than thirty or forty to the quarter of the inch. The red and white laminæ alternate, so that thick red laminæ on one side alternate with thin white ones; while on the other side of the glass, thick white ones alternate with thin red ones; while those in the middle of the glass are of equal thickness. The red, however, is found by the chymist to be essentially the same as that which produces the red of our own ruby—the suboxide of copper. The difference appears to lie in the tint of the white glass, and in the numerous parallel laminæ of colour. The white glass is coarse and thick, and generally of a cold greenish colour. Yellow staining is unknown. The patterns generally consist of short stumps of conventional foliage woven into lace-like patterns of great beauty. The outlines are very coarse and thick, and the ground is cross-hatched all over, so that the whole window has a beautiful lace-like appearance. It is generally crossed with bars and circles of bright colour, and bordered with a stiff conventional foliage border in rich colours, mixed with white glass.

Some patterns are of rich colour all over the window, with medallions of scriptural subjects on deep blue grounds. The subjects are represented by thick strong outlines, even round the delicate features of the face and extremities, and but very slightly shaded. The expressions are stern and exaggerated. The draperies approach the late classical models, from which they are evidently copied, but angular and stiff to a great degree. The attitudes are forced, and often unnatural, but the whole is well harmonised. These windows are grand and solemn in effect, but, from their darkness, are hardly suitable to our worship, when all wish to follow the service by reading. I have not seen those at Canterbury, but I believe that they are the best existing examples of this period. The five sisters of York are famous, though ruined examples of the white glass pattern.

(To be continued.)

Silk Manufacture.

(Continued and concluded from page 22.)

James I. appears to have been completely in earnest in his endeavours to establish the silk trade in his dominions, for he afforded a large measure of encouragement to a merchant of London, named Burlamach, and silk-throwsters, dyers, and weavers of broad fabrics, were brought over from the Continent; and eventually the trade arrived at that point of importance which has been already noticed by the incorporation of those engaged in it. In 1630 we find a proclamation issued against the cheating in the weight of silk practised by certain dyers, and an injunction given, "that no silk shall be dyed any black but Spanish black, and not the dye called London black, or light weight; neither shall they dye any silk before the gum be fair boiled off from the silk, being raw." Certain materials, too, were prohibited, such as "alder bark, filings of iron, or other deceitful matter," such, in short, as were calculated to add to the weight of the silk. In 1638 some of these prohibitions were removed, still by proclamation—a favourite method with Charles I.—instead of the former course of passing an Act of Parliament, and in consequence, caprice dictated the leading features of these documents; for neither the king nor those who advised him really knew anything about the subject with which they were meddling. The corporation of throwsters, however, had more to do with these matters than is generally supposed, for after getting a new charter, the members assumed to themselves the right, or rather obtained the consent of the king thereto, of admitting to their company only such strangers or natives whose opinions were known to be "conformable to the laws of the realm and to the constitution of the Church of England." Thus these short-sighted people actually adopted the very policy that at a subsequent period was to drive from their rivals, the French, the most skilled of their artisans, and enable this same corporation and their fellow-countrymen to compete with any other people in the same pursuits, so long as their own want of wisdom did not cause them to tie their own hands, by foolish restrictions adopted at their clamorous dictation by an easily led government. Up to the period of the revocation of the Edict of Nantes, all sorts of Acts of Parliament were passed for the regulation of the silk trade: the act of to-day being repealed by the whim of to-morrow, and anything like a permanent influence totally prevented through the ever-varying rules which "the wisdom of our ancestors" enabled them to concoct, under the imaginary notion that trade could flourish on legislation, instead of by and through ingenious machinery, industrious workmen, skilled artists, and intelligent merchants.

CORRESPONDENCE. — *White Lead.* — "John Grey." — You will find the information you require by consulting our index. —— *Colour Tubes.* "A. B. C." (Northampton)—You can obtain empty colour tubes from any of the artists' colourmen. The outside pages of the "Universal Decorator" undergo a process called "rolling," which gives them a glazed surface. Any picture that is clean and well defined can be used for the diaphanous process.

Technicologia.

180. *New Process of Electro-Gilding.*—Mr. Briant's process, verified by M. Jacoby, was made by him the object of a very favourable report at the Academy of Sciences of St. Petersburg. It consists in the substitution of oxide of gold for the chloride of gold, and in the employment of a very feeble current engendered by an element of Daniell. The following are the details of the process.—

Fifty-two grammes of gold are to be dissolved in nitro-muriatic acid, and the solution evaporated, in order to obtain the chloride of gold dry, and with as little acid as possible. The chloride is then dissolved in five kilogrammes of hot water, and 100 grammes of well-sifted magnesia added, and allowed to digest at a moderate temperature. The oxide of gold which is separated is found in combination with magnesia. This deposit, well washed, is then treated with water acidulated with nitric acid in the proportion of 375 grammes of acid to five kilogrammes of water; by its contact with this liquid the deposit cedes the magnesia, and is then simply hydrated oxide of gold, which is then to be washed on a filter, until the washing water no longer colours litmus paper.

It is with the oxide of gold that Mr. Briant proposes to form his bath: he takes of

Yellow prussiate of potash .	500 grammes,
Caustic potash	120 „
Water	5 kilogrammes,

and having dissolved them, the oxide of gold with its filter is added, and the whole boiled during twenty minutes. The oxide of gold dissolves, and there is formed at the same time a precipitate of sesqui-oxide of iron. It is allowed to cool, and is then filtered, by which a yellow liquid, fit for use, is obtained. The objects to be gilt should be well cleaned, and attached to the zinc pole of an element of Daniell, while the upper pole is connected with a platina plate.

The gilding may be effected in a warm or cold solution: in the first case, the deposit forms more rapidly, but with less delicacy. In order to obtain a durable deposit, and analogous to fire gilding, several hours are required. When the liquid is exhausted, oxide of gold is again added, by which a fresh precipitation of oxide of iron is produced.

The gilding thus obtained perfectly admits of being burnished, and of undergoing all the operations employed to produce mat or dead gold.

M. Jacoby makes the following remarks:—

One of the most difficult problems to solve in this branch of manufacture is the production of dead surfaces. Although we know the nature and manipulation of the process, it is only the Parisian workmen who can perfectly succeed in this field: hence it is that these operations are always conducted by French workmen, as well in native establishments as in foreign establishments of some importance.

The production of dead gold is always accompanied by a loss of metal, inasmuch as it necessitates a system of corrosion by chlorine. Nevertheless, Briant's process enables a matted surface to be obtained by galvanic agency, which is not inferior to the best of Paris, whilst it does not require any of those subsequent operations of the kind required by fire gilding. This deadening is spontaneously produced as soon as the coating of gold has acquired a certain thickness; it is more beautiful when the operation is carried on in the cold; by a very simple artifice a more or less reddish tint, on the one hand, or a whitish one on the other, is produced; it is merely sufficient to dilute the bath by a greater or less quantity of water.

When the objects to be gilded are polished and brilliant, the electro-gilding will also be brilliant, and it requires a longer time and a thicker coating of gold to obtain a deadened surface. It is therefore important to communicate, in the first instance, to the objects a deadened surface by the process employed in fire gilding, or more economically, by covering them at once with a thin pellicle of copper by electric agency, which, as is well known, can be obtained with a beautiful matted service. But in both cases it is indispensable to eliminate the last traces of acid which might adhere to the objects; for this purpose they should be washed with water rendered alkaline, and then with pure water.

An important point to be considered is the choice of the substance which is to be employed for protecting the points which should not be gilded—for it must be remembered that the gilding bath is alkaline; for this purpose plaster impregnated with an alcoholic solution of lac is recommended.

M. Jacoby mentions another process for obtaining a good electro-gilding. He dissolves a ducat of rolled gold in nitro-muriatic acid, evaporates to dryness the solution, and dissolves the product in a liquid containing 576 grains of yellow prussiate of potash and 144 grains of caustic potash; the mixture is then boiled during half an hour, after which it is filtered and diluted with a sufficient quantity of water to give to the bath the weight of 340 grammes. After this the bath will be found composed in the following manner:—

Gold	1 part.
Yellow prussiate of potash . .	12 „
Caustic potash	3 „
Water	120 „

181. *Power's Patent for Silvering all Sorts of Metals and of Glass.*—The patentee's process is performed as follows:—He takes one ounce of crystallised nitrate of silver, dissolves it in twice its weight of distilled water, and adds 9½ per cent. by weight of nitrate of liquid ammonia. He then adds six times the weight of the nitrate of silver, of spirits of wine, agitates the liquid, and adds 15 per cent. on the whole volume of resinous spirit (composed of one part of resinous matter, by preference, gum galbanum, to five parts of spirits of wine). The liquid is then left to settle, and filtered, after which it has added to it nine times its quantity of spirits of wine, with the further introduction of 8 per cent. of liquid ammonia, and a quantity of spirits of wine equal to its whole volume. The solution will then contain about 5 parts nitrate of silver to 1000 parts of liquid. The liquid thus prepared and filtered may be used immediately in connection with a galvanic battery, in the manner usually practised by platers—but it is better to let it remain quiescent for some time. The anode, or thin sheet of silver in connection with the positive pole, acts perfectly in this liquid, and gradually dissolves in the bath; the deposition commences immediately on the objects to be plated being introduced into the bath, in a white and brilliant form, and the thickness of coating can be regulated at pleasure. To ensure its more perfect adhesion, in certain cases the metals may be first passed through a solu-

tion of nitrate of mercury. When glass is the material to be coated, a thin film of silver is previously formed on it by adding to the liquid a few drops of spirits of cloves in a separate bath, and the quantity of ammonia used in preparing the bath is only from 2 to 8 per cent. By precipitating copper on the silvered glass, and then detaching the two metals, plates may be produced suitable for daguerreotypic or photographic purposes.

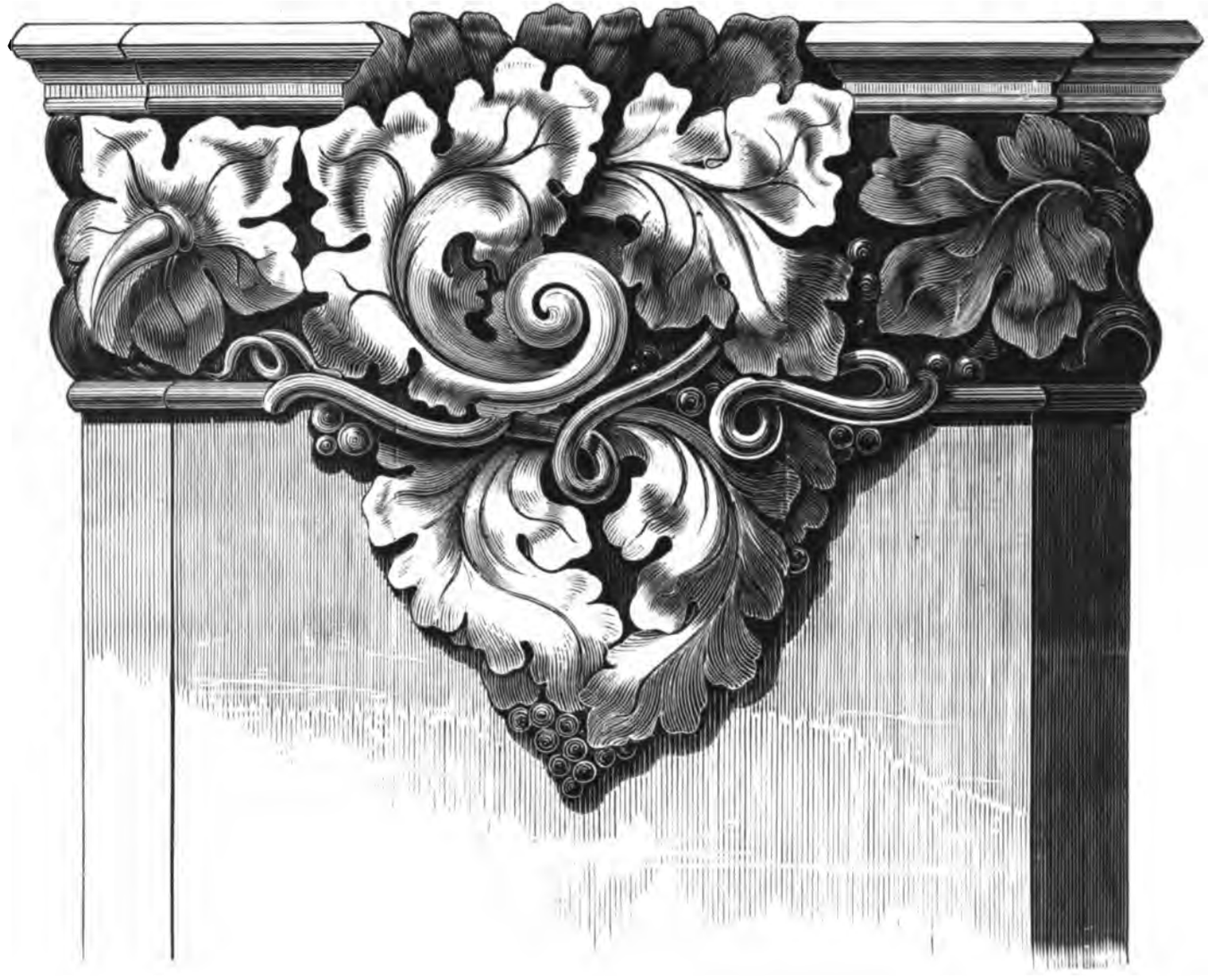
182. *To Crystallise Flowers.* — Dissolve eighteen ounces of pure alum in a quart of soft spring water (observing the same proportion for a greater or less quantity), by boiling it gently in a close tinned vessel, over a moderate fire, keeping it stirred with a wooden spatula until the solution is complete. When the liquor is *almost* cold, suspend the subject to be crystallised, by means of a small thread or twine, from a lath or small stick laid horizontally across the aperture of a deep glass or earthen jar, as being best adapted for the purpose, into which the solution must be poured. The respective articles should remain in the solution twenty-four hours; when they are taken out, they are to be carefully suspended in the shade until perfectly dry. When the subjects to be crystallised are to be put into the solution while it is quite cold, the crystals are apt to be formed too large; on the other hand, should it be too hot, the crystals will be small in proportion. The best temperature is about 95° of Fahrenheit's thermometer. Among vegetable specimens that may be operated on are the moss-rose of the gardens, ears of corn, especially millet-seed, and the bearded wheat, berries of the holly, fruit of the slow-bush, the hyacinth, pink, furze-blossoms, ranunculus, garden-daisy, and a great variety of others; in fact, there are few subjects in the vegetable world that are not eligible to this mode of preservation. The fitness of the solution for the purpose may be ascertained by putting a drop of it on a slip of glass, and seeing if it crystallises as it cools; if so, the solution is sufficiently strong. Then twist round a sprig of plant, a cinder, a wire ornament of any kind, some cotton, or, still better, some worsted. After being immersed as already directed, the surface of the whole will be found covered with beautiful crystallisations.

183. *Gold Solvent, and Test.*—The ore, crushed to powder, is first to be put into a mixture of muriatic acid, water, and chloride of lime to the consistence of cream; after remaining together for twelve hours, three times its bulk of water is to be added, and the whole strained. This operation will dissolve out all the gold and iron from the ore. To the clear liquor which comes away we are now to add soda (washing soda) until it ceases to taste sour, or, rather, until it tastes of soda. This being done, we are then to add a pair of Seidlitz powders, which cause all the iron to be deposited, leaving the gold in solution. After again straining or filtering the liquor, we must lastly add a solution of protosulphate of iron (green vitriol dissolved in water); this mixture causes all the gold to be deposited in the form of a brown powder, which, being heated and hammered, presents the usual appearance of the sought-for metal. The proper Seidlitz powder consists of (*blue paper*) potassio-tartrate of soda, two drachms; bicarbonate of soda two scruples, mixed. The *white* paper contains half a drachm of tartaric acid. If it be inconvenient to use or procure the muriatic acid and chloride of lime, named first, to put the ore in, we can use with like effect a mixture of saltpetre, common salt, and strong vitriol. All the materials herein named are exceedingly cheap, and the principle to work upon is equally sure, for the detection of small quantities of gold in ore, to the most elaborate assays of the refiner. If the ore contain any platinum, it is dissolved with the gold, and can be precipitated from the solution by sal-ammoniac, which process is hastened by the addition of spirits of wine, gin, or brandy.

GELATINE MOULDS.

Notwithstanding the art of casting is one of the most extensively known and used by manufacturers, which affords great facilities in multiplying given patterns, in the reproduction both of mechanical, architectural, and artistic specimens, it is not until late years that the processes of casting have been simplified and its uses greatly extended. Formerly little more was done by it than to reproduce flat surfaces—or if surfaces in relief were attempted, the mould in which the cast was made was necessarily divided into many parts, involving great labour in putting it together, whilst a large number of seams were produced upon the surface of the cast, which it was necessary to remove by hard labour. Manufacturers in Birmingham know how often their workmen have been occupied whole days and nights in putting together a small mould. These difficulties, and the inapplicability of sand-clay or plaster to form a mould from other than rigid bodies, have led to a variety of experiments, and about the beginning of the present century the Germans introduced the use of glue, which was not, however, taken notice of in England till about the year 1826, when Mr. Douglas Fox employed it to take casts from anatomical preparations, calcareous concretions, vegetable substances, &c. Previously it had been customary to use wax or soft clay; but in many instances the moulds so obtained could not be removed owing to the underlap; it therefore became necessary, in order that the mould might be removed, to fill up all those parts which gave sharpness and clearness to the design. To overcome this difficulty, and to enable objects in relief to be cast, he made use of glue; and with a view to giving greater elasticity to the moulds so obtained, and also to enable them to be kept in a fit state for use during a longer period than they otherwise could be, Mr. Fox mixed treacle with the glue; but the objection to this body immediately became apparent, as it discoloured the surface of all white bodies, and was thus limited in its application, as none but plaster or wax casts could be taken from them: it accordingly fell into disuse. About the year 1844 attention was again called to this subject by the production, in France, of a series of casts in imitation of ivory; and about 1846 the Society of Arts, in England, offered a prize, which was awarded to Mr. Franchi, for his specimens of casting in plaster composition in imitation of ivory. At the time the award was made, the nature of the material employed by him in forming his moulds was not known; but it has since proved to be pure gelatine: and owing to the skilful manner in which he has applied his material some very exquisite electrotype casts, which are deposited in the Geological Museum, have been obtained from objects greatly undercut, and great advantage has since resulted from the use of this material. Mr. Franchi has since found by experiment, that he can obtain from a gelatine mould a cast in gelatine in relief, without losing any of the sharpness of the original. This has enabled him to apply objects modelled on flat surfaces to cylindrical bodies, thus saving the labour and expense of remodelling.

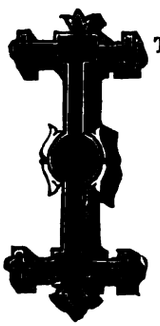
BORDERS (ETRUSCAN).



PILASTER CAP (PERPENDICULAR GOTHIC).

Windows and Window Openings.

By Mr. B. A. C. Herring.



I THINK that there is little to be said about the windows of the ancients, seeing that they were certainly not amongst the characteristic features of their architecture; indeed, we know little or nothing about their domestic architecture, the ruins of their public buildings being all that is left to us. We may, however, except the remains of Herculaneum and Pompeii; and here we find that nearly all the houses were of one storey only, and faced inwards, being lighted by atria or courts: the reason of this was that, having no glass wherewith to glaze their windows, they could not be private from the street, except at the expense of excluding both light and ventilation.

As this was the arrangement at these cities, we may infer that the windows were similarly treated by the ancient inhabitants of Rome.

We have plenty of examples of window treatment in the Romanesque, the successor of the Roman; and although generally this style is called debased, and an attempt to imitate the Roman, I feel very much inclined to give considerable praise to the endeavours which this style gives evidence of to emancipate architecture from the stern sameness of Classic beauty—I say beauty, because Classic architecture is beautiful, only we do not want too much of it.

Many persons apply the term Romanesque to Lombardic, Byzantine, Norman, and Saxon, but I think wrongly; the Romanesque having more of the Classic element in it than the Lombardic, the Norman and Saxon having the Lombardic family features, and the Byzantine being something more artistical and refined than either. The windows in the Romanesque and Lombardic styles are generally very plain and unimportant features, excepting the round windows, which are good: we notice that now the round arch has become a general feature, and the chief characteristic of these styles. The well-known cathedral of Pisa is a good specimen. The Byzantine windows have more pretence, and we find two-light and three-light windows occurring, the stilted arch being much used, and the capitals of the columns receiving the arches and dividing the windows, being very delicately carved in most cases.

The form of these capitals is generally somewhat peculiar, being square blocks tapering until they meet the shaft. We likewise find in the later period of this style the pointed arch.

We will now keep ourselves nearer home, and see what have been the characteristics of our own windows, at the same time giving a look at continental neighbours now and then.

As we have before said, Saxon and Norman architecture have a decided resemblance to the Lombardic. The Saxon is very ugly and rude: the round arch is in use, and in situations where the windows do not require glazing, they are divided into two or more lights by shafts or pillars, generally of the *genus* baluster.

Norman architecture can boast more of its doorways than of its windows; they are generally rather plain and mostly single lights. Sometimes they are in pairs, divided by a single shaft, with a larger arch over. The round arch is a leading feature in this style, and as in the Romanesque and Byzantine, the centre from which the arch is struck is sometimes above the impost line, forming the stilted arch, and sometimes the horse-shoe arch is to be found.

We come now to Early English windows, and now we may revel in abundant stores of beautiful art. Early English commenced at the end of the twelfth century, and at first could not seem quite to divest itself of Norman massiveness. However, it very speedily shewed its superiority over its predecessor, and its simplicity, elegance, and constructional merit are such that it must always be considered excellent. The windows are almost always of a long and narrow proportion, and now the pointed arch—the glory of Gothic architecture—is the form in use. These windows are single-light windows, or grouped together in twos, threes, fives, and sevens.

A very favourite way of ornamenting the windows of this style is by thin columns, quite detached from the other stonework, and oftentimes of a more costly material. The rich mouldings are generally very effective, and often enriched with the dog-tooth ornament. We find the origin of tracery in the windows of this style: it commenced by grouping two or three lancet windows together under one large arch, and filling in the tympanum or blank space between the soffit of the large arch and the head of the smaller ones with circles or quatrefoils. Gradually the irregular stone masses or spandrils thus left between the openings came to be pierced likewise, and formed a kind of tracery, called by Professor Willis, plate tracery.

This brings us to the commencement of the thirteenth century; and now bar tracery claims notice (at first mixed with plate tracery, as seen in the beautiful circular window from Lincoln), and continues throughout the succeeding mediæval styles.

Bar tracery means that the different forms in the windows are separated by a bar of equal thickness and similar section throughout, varying in pattern and disposition of line as the styles varied.

Before leaving Early English for decorative windows, I must not forget to call particular attention to the singularly fine circular windows of this period of Gothic art, as exemplified in the circular windows at York and Lincoln cathedrals and Beverley Minster. At the end of the thirteenth century, as the perfection of Gothic architecture was being quickly developed, we find the tracery of the window assuming elegant geometric forms; and still later, in the fourteenth century, the flowing tracery of what is termed decorated architecture filled in the window openings of our cathedrals and abbeys. In the decorated style, the windows have heads of various form, the two centred pointed arch, of different proportions, being the most in use; but segmental and ogee arches and square heads, are frequently to be found. Having now arrived at the culmination of Gothic architecture, we must look at the style in use throughout its decline—viz., Perpendicular. This style is not to be compared with the Early English and decorated; but still the picturesqueness of much that is found in perpendicular, and the luxuriousness of its carving, cannot fail in finding for it many admirers. The tracery of the windows in perpendicular is generally very stiff, perpendicular and horizontal lines forming the characteristics. The window heads, as the style leaves the decorated, are formed of four centred arches; and, as the style enters the times of Elizabeth and James, the heads get flatter

and flatter, until the arched form is abandoned, and rectangular openings, divided by mullions and transoms, are the last features of Gothic in England. I said just now that there was much that was picturesque in perpendicular. To illustrate this, I must call your attention to the bay and oriel windows, so peculiar to this style, and which add so much to the appearance of our old halls. The terms bay and oriel, although often used as meaning the same thing, may, I think, be applied thus:—Bay window, to the recess in a wall projecting outwards and resting on the ground; and oriel, when the projection does not reach the ground and is supported by corbelling. This, I believe, is the present acceptation of the terms, although oriel appears to be quite as right for one as the other, having most probably been applied to the recesses at the ends of our old halls, which served as a kind of oratory. We must now leave Gothic, first noticing that the Gothic window of France was similarly treated to our own until the perpendicular period, when the French decorated merged into the Flamboyant, which, I fancy, is more beautiful and artistic than our perpendicular.

Italy has not all this while been idle; but, taking example from France and Germany, has had a try at Gothic, and produced what we now-a-days call Venetian-Gothic. And is it not to be regretted that Italy practised it only long enough to shew how much more she might have done had she persevered in using this style? However, sufficient has been done to shew that Venetian-Gothic might be followed up and perfected—not copied.

If you want to know more about Venetian-Gothic, get Street's "Brick and Marble in the Middle Ages;" here are two illustrations copied from it, shewing the beauty to be attained in this style. Coloured materials are abundantly used, and the round arch is found, as well as the pointed, in many of the windows; oftentimes the intrados of an arch is round, and the extrados pointed.

Let us leave architecture alone for a time, and turn to other subjects, and then look again and see what has been doing. Renaissance has been at work, and like a person with plenty of materials for writing a book, and not knowing what to adopt and what to reject, so has renaissance clasped almost all styles in its clutches, and has produced a generalised sort of architecture, in which in England the mullion of the perpendicular Gothic, and the Classic column and cornice of the Roman, are used together for the decoration of windows. Renaissance however, has been at work in Italy, and has brought about what we know as Italian architecture.

We must now make acquaintance with the works of the great Italian artists and architects, if we want to see how window architecture progresses. We have Vignola, Alberti, Serlio, Scammozzi, Michelangelo, Raffaële, Palladio, and many others, who pushed forward the spread of Italian architecture.

England first adopted the Italian by having it brought forward by the designs of Inigo Jones. Then followed Sir Christopher Wren, Hawksmoor, Gibbs, and Sir William Chambers.

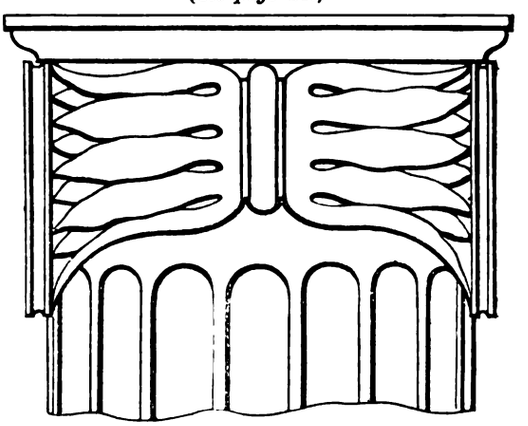
Their treatment of windows is so well known to you that I need not enter upon it; the feeling running through their designs is similar to those I have just described.

Let us consider the treatment of modern windows. Windows are with us, as with every civilised nation, objects of the greatest importance in our buildings, whether public or domestic. Their size must be governed by circumstances, and not by any established rules. A window that is the best size and shape for a hot climate will not do for a cold one; a window suitable for a wide street is too small for a narrow street; a window suitable for a town house is not so suitable for the country. Taking these things into consideration, all the rules laid down by Vitruvius, Palladio, Scammozzi, and Chambers, are really of little use. I cannot help feeling rather amused at these worthies, for they have laid down their rules, as though the peculiar style of architecture which they followed was to be the succeeding one for all generations.

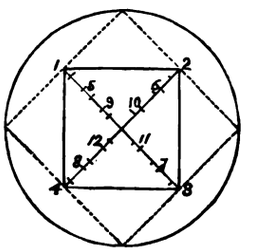
(*To be continued.*)

SIDE VIEW OF IONIC CAPITAL.

(*See page* 21.)



DIAGRAM, SHEWING THE POINTS FOR STRIKING THE IONIC VOLUTE.



Painted Glass.

By W. A. Sanford, Esq.

(*Continued and concluded from page* 26.)

If figure and canopy windows are used, the canopy consists of a simple arch in coloured glass, with some odd-looking ill-fitting towers and turrets rising from it; or may consist of a simple semicircular or pointed arch alone, without line or ornament. The figure is thin and most stiffly drawn, with the folds of the drapery disposed in thick perpendicular lines, giving a columnar effect to the figure.

I shall now pass to the style which was in perfection in the time of Edward III. The glass had now arrived at a perfection which no succeeding age has equalled for effect and feeling. The rich warm tone of the white

imparts a harmony to the colouring which can only be reached by adopting a similar tint for the foundation; the coloured glass itself is almost as deep and rich in tone as that which was used in the preceding age, while the variety of tint is far greater. The introduction of rich tabernacle work is carried to the utmost pitch which the true principles of glass painting allow of. The foliage is as near nature as the artists could draw. The patterns are most beautiful and graceful, without a trace of stiffness. The utmost art and care the artists were capable of were bestowed on the figure; and when they erred in this respect, it was clearly because they knew not how to draw better. In short, all evinces a spirit of strength and vigour of thought which was so characteristic of the age in other respects. I regret I have no examples of this date to shew you. They are too varied to describe in a short paper like this; too beautiful to be done justice to by a copy. I must refer you to the magnificent, though mutilated beauties of the nave at York, and those still more utterly crushed, with one fairly restored by Mr. Williment, in the Ladye Chapel at Wells. There is also a small but very beautiful bit at Brimpton, in the little odd parish church, representing the Salutation of Saint Mary and Saint Elizabeth. But in this style there was one defect—namely, the method of shading, in which, and in which almost alone, it was inferior to the next.

I will here remark that in painted glass one of the principles which cannot be violated with impunity is, that all ornamental work must be flat; no perspective or rounding up of ornamental portions produces a good effect; it always seems unnatural, and takes away from the glassy appearance every good glass painting should possess. In the fourteenth century this principle was fully understood. The canopies were always flat arches, with gables over, with flat towers and flat pinnacles, with flying buttresses supporting them. All the foliage was represented as flat on the surface of the glass. The rounding was confined to the figures. In this period diapers were used with some frequency. These are produced by laying a thin coat of semi-transparent enamel on the glass, and picking out the pattern with a sharp point or flat edge. They were principally confined to backgrounds of tabernacle work, but in the next age were profusely used on draperies. They are very beautiful, and, when well managed, give a rich transparent look to the glass, which cannot be attained in any other way.

In the next style a great degeneration is witnessed. The rich, noble-looking flat canopy is frittered away in badly-drawn canopies in incorrect perspective. The solid tower and spire is cut up by a number of parallel ill-placed pinnacles, without meaning or use. The colour of the white glass has faded to a poor washy tint, while most of the colours look washed out and bad, while some rubies, blues, and scarlets make the tender tints still weaker and poorer. The glorious manly vigour of the fourteenth century is gone, and a muddling after richness of detail and confusion of line—made more conspicuous by an improved style of drawing—endeavours to conceal the want of independent thought and weakness of conception, which is evinced throughout.

The foliage is hardly to be recognised as such; it more resembles feathers than leaves; the borders are stiff, composed of strange-looking devices on rectangular pieces of glass, with or without squares of red, blue, purple, or green glass between each piece. There is no invention even in the quarry ornament; all is stiff, and, like the architect, the glass-painter seems as if he were working in fetters.

Any one who spends a few hours in York Cathedral will be painfully convinced of this. The nave is of the one glorious period; the choir and its aisles of the latter. One singular instance is most conspicuous there. There is at the east end of the north side aisle of the choir, a window which has been repaired at the expense of some others; a decorated figure and canopy has got amongst some perpendicular glass. My eye was caught from the extreme end of the nave by this single small figure; it overpowered in effect the whole of the rest of the glass at that end of the church. One merit, however, and that of surpassing importance, belongs to this style, *i.e.*, the introduction of tripled shadows. In the earlier periods the shadows were produced by shading with the brush the portions required, and leaving the touch of the brush visible; the deeper shadows were produced by shadowing the parts again and again. Now the effect of this was, that in no part, except the high lights, was the glass transparent; the rest, for all one knew, might have been painted on canvas. The outlines also were necessarily broad, and in windows near the eye this produced an inevitable coarseness of expression, a want of finish in the extremities, which was, undoubtedly, an evil. This was met by the introduction of the tripled shadow I have before described. This left the light free to pass in every part of the glass, even in the tripled shadow. The edge of the shadow was as clearly defined as before the black outline was reduced, or could be dispensed with altogether, and the whole painting looked as if painted on glass.

In this degenerate age, and late in it, there were yet some noble thoughts, occasionally flashing out in those expiring lamps which gave a melancholy glow to the fading glories of the pointed style. Some of these scattered rays were caught by some of the professors of my favourite art.

Fairford Church, in Gloucestershire, is a noble church, nobly built, and nobly decorated on one design. On either side the prophets and apostles marshal the faithful on their heavenward way. The martyrs look down in triumph, their persecutors in dismay, on the holy pilgrimage. The lessons of religion are taught by pictures of the lives of Christ and of His holy saints, while terror to the unrepentant, and hope and trust for the faithful, are sought to be impressed by a vast painting of the Last Great Day; and all this is nobly done. The figures are natural in their proportions, natural in their positions, and, with solemn, well-fitting expressions, are drawn with an excellence which bespeaks the teaching of the ripening Italian school. The colours are rich and harmonious, tender yet vigorous. Some of the figures—the Saint Michael in the Last Judgment especially—are models of grace and beauty. The very quaintnesses are either fearful, or excite but a friendly smile. There is but little to complain of, and that alone in the decorative portion. But the faults are easily seen, and with our present knowledge easily avoided in an imitation or a rivalry.

In Lincoln Cathedral there is glass of the same date, of even superior beauty; but this I have not seen, and will not, therefore, describe it—it is also of foreign origin.

In England but little glass was done for churches after the reign of Henry VIII. Some was imported from Holland in the reign of Charles I. But this was a bad imitation of oil painting, as far as mosaic painting went, and the old art was gradually lost, though some few traces of the true practice are to be met with as late as

the middle of the last century, till it was attempted to be revived by producing the colours by enamels on white glass. This was an egregious failure. The usual fate befell it which attends all arts when professors make a mystery of them, and attempt to humbug their contemporaries. The art fell into contempt till its revival within our memory.

In a short paper like this it is impossible to do more than indicate the existence of a style of glass proper to each style of the pointed architecture, and to shew that it is characterised by pecularities, which harmonise it with the architecture of the period. Those who wish for more detail I would recommend to study a couple of small volumes of low price, "Winston's Hints on Glass Painting," which contain more real information than any book I have met with. Large works there are on particular churches and particular styles, but I do not know any book that goes to the root of the art but this.

I will now consider what is to be done with paintd glass in the present day. I shall no doubt in this part of my paper make observations which will not agree with the present ideas of many on the subject. But I have now worked at glass for some years, and have tried a number of experiments, and have seen a good deal of glass, and can only say that the advocacy of these principles is the result of a firm conviction of their truth, and of their applicability. Every one who has anything to do with art will agree with me in maintaining that the mere copying of an ancient work, however good, is not art. How much more, then, is this the case when copying a work in which we can see manifest defects? The exaggerated attitudes, the thick coarse outline, the want of shading of the early style, the incorrect drawing of the figures, the heavy shadows of the second style, perfect as it is in almost every other respect, the multitude of defects of the third style, relieved only by the improvement of the drawing and shading, are all manifest defects which we can see, and which blemish the best works of each age. We surely need not copy them. We may study, with the reverence due to those works of the dead in which we find an excellence so great as exists in those, we may catch some rays of the inspiration and feeling which animated them. We may study their methods of overcoming difficulties, which were greater than those we now experience. But while we do so, we must not forget that we live in another age; that it is our business to reflect to posterity the spirit which animates us, and not only that, but we must sift the good portion of that spirit from the evil. Nothing meretricious, nothing merely done for shew, nothing meaningless, should be introduced. If Giotto represented a dance, the figures were much in the attitudes we see them represented in our old windows, and such were then thought graceful. Do we really in our hearts think them so now?

If Aretino or Orcagna wished to excite terror, they did it by the representation of forms, which no doubt had the effect then; but now rather produce the effect on our feelings of an ancient comic mask. But who admires not, and would not, if he could, emulate, the expression of noble piety which animates the countenances of the first, or the grand conception of power which was, to a certain extent, realised in the victorious angelic forms of the two last? No one thinks of copying the frescoes of either for the adornment of a public building, or voluntarily imitating their want of drawing. With reverence I say we study them, with, I hope, a vivid appreciation of their beauties, but with as keen a sense of their defects.

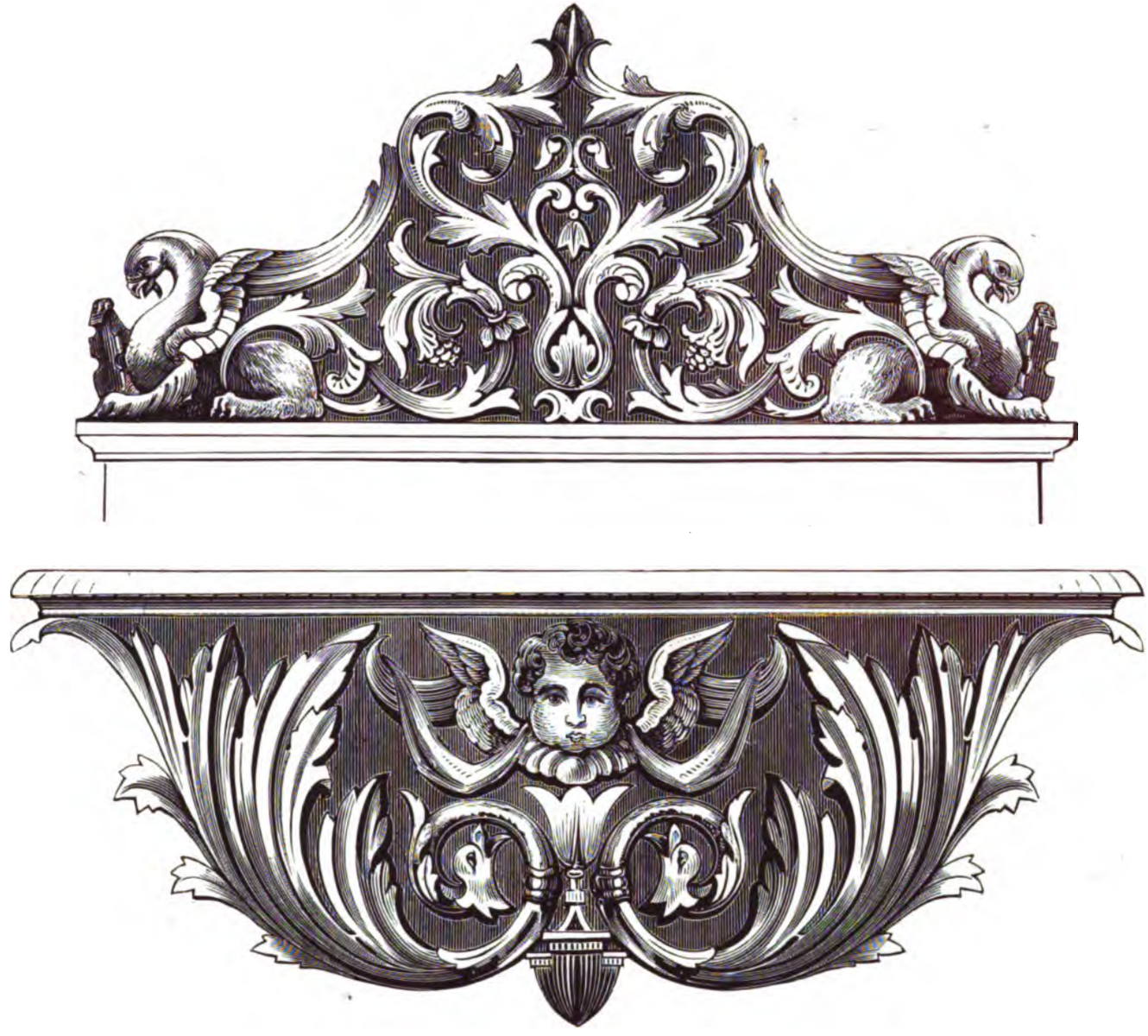
Again, let us take the practice of our best artists with regard to the great period. They learn, or endeavour to learn, their drawing from Raffaële and Michelangelo, or Massacio; their colour and, so to say, manly vigour, from Titian, Paul Veronese, or Giorgioni—Mr. Ruskin would add, Tintoretto; correctness from Andrea del Sarto; their light and shade from Correggio; and much that is great in all from Leonardo da Vinci. The noble forms of Phidias give dignity and grace to their conceptions. They study, and endeavour to identify themselves with the holy thoughts of Perugino, Francia, or Cotignola, or soar to the very gates of heaven with Angelico da Fiesoli. But they imitate not their high excellence. They take nature, and nature alone, for their model, and represent her as they see her with their own eyes, and look not at her with eyes distorted by varnish, and dirt, and age, and the restorer's blunders and distortions.

Their mode of telling their story is their own—the composition, the attitudes, the colours. The expressions are their own—the reflex of their own minds—the reflex of the present age; the mode in which they—the mode in which the present age conceives the subject. Their, our age is tutored by what has gone before. All that is left that is great in art, all that is left that is great in poetry, all that is left that is great in story, is theirs—is ours; it belongs to this age, and therefore this age must differ from every age that has gone before; and the artist is a traitor to his art, to his age, who does not represent, for the benefit of posterity, the feelings of those of his own time; their mode of conceiving the subject he represents, which, as I have said before, must differ from all that has gone before.

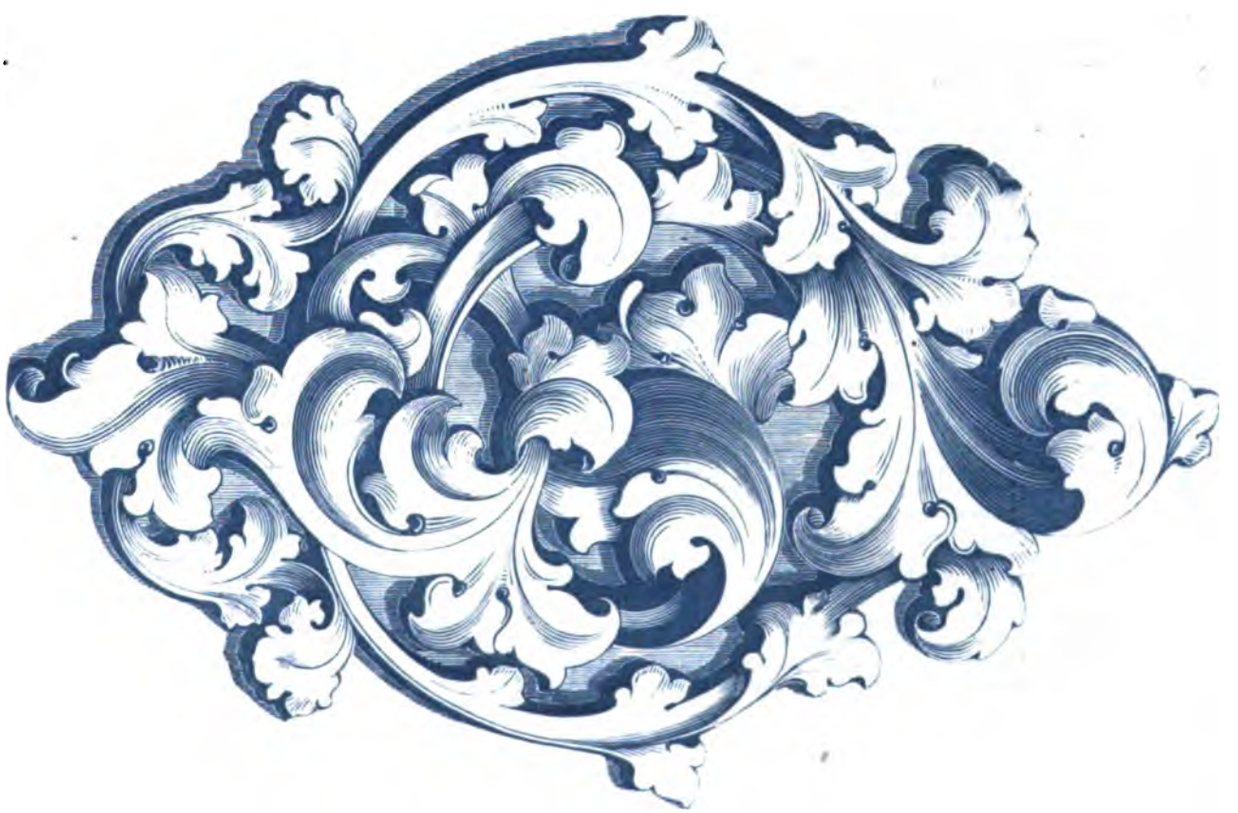
If such be the case in oil-painting, why should it not be the case in the sister art? Why should not this bear a part in being the exponent, the legacy of the spirit which animates the intellect of this age?

The powers of the art are more limited than those of oil-painting or fresco; but they are very great. The power of expression is great, if not greater, than in either. The colours are more vivid, and the light and shade are equally strong. The principles of composition are different, inasmuch as it is necessary in a glass picture to distribute the light and shade as equally as possible over the picture; but this is, in reality, an advantage, for light and shade in nature are so distributed. But any number of distances can, with care, be represented, particularly if the window is distant from the eye. The outlines certainly are strong and hard, but these disappear in what, to the uninitiated, is an unaccountable manner. There are artifices for getting rid of difficulties of cutting which are simple in the extreme, and only require a little ingenuity in the application. One colour cannot be shaded into another, except in rare instances; but is this the case in nature, except in the only case in which the manifest inferiority of glass exists—that is in the human face? All that glass can do here is to take the high tint which is most prevalent in flesh, and to shade it carefully with brown enamel. The effect of this is not felt as an anomaly in practice. Indeed, I have heard people, who know not the method of glass-painting, imagine that the pink tint of the cheek, the ruby of the lip, the blue of the eye, exist in a window of my own design, which was but coarsely executed.

The imagination supplies the defect, as it hides the lead, and the necessary though unsightly saddle-bar.



TOP AND END PIECES, FROM AN OLD LOOKING GLASS.



PANELS (FRENCH).

Aluminium, and its Application to Trade Purposes.

LUMINIUM, a strange looking white metal, standing intermediate between the commoner and the noble metals, but coming nearer to the latter, has become an established manufacture in Europe. In mass its behaviour in manufacture is ascertained; its various alloys have been tried; its great sonorousness and remarkable brightness made known: above all, its power of resisting the effects of chymical agents and its chymical properties have been tested and fixed.

A short time ago, when M. St. Clair Deville was trying experiments with it in Paris, at the expense of the Emperor, it was valued at £3 an ounce. A brief period elapsed, and it had fallen to 7s. 6d. an ounce. At the meeting of the Society of Arts, on the 2d inst., a manufacturer made the striking announcement that he had undertaken to supply 500 ounces of aluminium at 3s. 9d. an ounce. When it is considered that this metal is abundant (of course) in granite and clay, and in the alum formations is as abundant as elsewhere, there is every probability that when this year is at an end it will be at 2s., and when the next year is over at 1s. an ounce. May not the time come when aluminium will be 1s. a lb.?

From aluminium being already below the price of silver, which it resembles in whiteness, though not so clear and bright, jewellers and goldsmiths have attempted to employ it as a good substitute for that metal. At present it does not seem to be altogether adapted for jewellery. But if combined with palladium, it would produce articles of brilliant whiteness, for palladium has a finer polish than silver, and as aluminium does not tarnish as silver does, the combination would be far preferable to silver. For plating, aluminium is coming into use. It bears the alloy with nickel, a most available alloy for the plating trade. For tureens, meat dishes, side dishes, epergnes, and centre pieces it is a very valuable base; also for trays and cake baskets, racecups and tankards, but particularly for lamps and inkstands, candelabra and candlesticks. It has also many advantages for travelling articles of plate—India, for example—and for mess plate. One of the alloys with copper produces the best imitation of gold yet obtained; and the jewellers of London, Paris, the Hague, and Amsterdam are driving a great trade in the sale of aluminium gold chains and ornaments, which have been in wear for some months and are certainly very fine articles. From its lightness aluminium can be made into earrings about seven times the earrings of the present size and of no greater weight. Nor is it unlikely that gigantic earrings may become peculiarities of the artistic representations of the age, and be a more lasting type of female caprice than Punch's aversion, crinoline. If a new crown is to be constructed for the Empress of the Indies, aluminium, sharp, untarnished, having an appearance equally brilliant as gold, is the metal that should be employed to relieve the weight of the imperial diadem. Because it is light, aluminium is used by mathematical instrument makers to form supports for optical instruments; they have already applied it to the frames of eyeglasses, spectacles, and opera glasses.

The specific gravity of aluminium is the same as that of glass. Omitting decimals, it is 2, that of zinc and tin is 7, and of copper nearly 9, so that aluminium is three and four times lighter than those metals. The specific gravity of silver is 10, of gold 19, and of platinum 21, so that aluminium is five, nine, and ten times lighter than those metals. Aluminium has resources greater than glass. It takes an ornament that glass cannot; and decorated aluminium is more durable than glass. Lighter than iron, it is better. May not then domes and vaults be obtained of a much greater capacity than the vault of the Crystal Palace at Sydenham? The grand iron domes that have been projected in Europe and America will be surpassed. Aluminium will allow spires to be raised far beyond the limits even of iron. Such a spire as that at Rouen can be executed in this new material, and carried to a much greater height. For roofing, it will be the lightest and most effective material. For purposes of ornamental or luxurious splendour it affords considerable resources. Take, for instance, an ornament of a large size to be suspended from a high roof or ceiling. If made of aluminium bronze, it will be lighter than if constructed of any other metallic composition; if of aluminium gold, it will be lighter than copper, have a bright gold surface, and be free of tarnish. Thus we may very well conceive a gorgeous chandelier for a palace, town hall, or theatre so manufactured. Moreover, it takes a sharp cast for the finest artistic touches.

Another remarkably developed property of aluminium is sound, which may lead to modifications in instruments for exciting and propagating sound. Musical instrument makers have hitherto not been successful in their attempts, for aluminium mouth pieces have decomposed from the action of the breath; but this failure seems to have arisen from want of experience in the manipulation. They have used wrought instead of cast aluminium, for the latter resists the effects of chymical agents. Hence dentists are using cast aluminium for dentistic purposes in the mouth, as it resists acids and gases. We may then, in due course, expect to see cast aluminium used in all tube and wind instruments. In stringed instruments we have yet to learn the value of aluminium, which draws a good wire. It will yield a new resource to the organ builder, and produce, probably, still more powerful instruments. For the same reason it possesses peculiar powers for suspended bells. If a bell of 8 tons weight be made from aluminium bell metal, it would be equivalent to a bell of 12 tons. A St. Stephen's bell of 12 tons of the new alloy might be equivalent to what we have not in England, an 18 ton bell. In weak spires and peculiar situations we may have Great Toms, striking bells and chimes which are now deemed impracticable. For lighthouse bells it will be very valuable.

If a lower oxide of aluminium, a protoxide of aluminium analogous to the protoxide of iron, can be obtained, great effects will be produced in many branches of the industrial arts. As the arsenic greens influence internal decorations in paints and wall papers, so we may expect new dyes from other applications of aluminium, and these will affect carpets, hangings, and furniture.

Technicologia.

184. *New Process for Fixing Chalk Drawings.*—The first methods for fixing works of art executed in chalks, charcoal, and other substances in danger of destruction from the slightest touch, date from very far back, and in some cases are perfectly successful. Sometimes the drawing is rapidly dipped into a bath of some glutinous liquid, and sometimes the liquid itself is applied with a brush. This, however, cannot be done with chalk or charcoal drawings. A very thin and transparent sheet of bibulous paper is laid on the drawing, and the brush is then passed over the protecting sheet; the glutinous liquid penetrates to the drawing, and the wished-for effect is produced. In the case of chalk drawings (pastels), however, this process has the inconvenience that certain tints which, on being wetted, change their tone, do not return to their former state on drying. This circumstance led to some experiments with a view to find a better fixing fluid; and after many trials it was found that the silicates of potash and soda answered very well, but with the drawback that during the application the colours were liable to be disturbed so as to give the appearance of being "smudged." At length, however, this was obviated by a very simple plan, merely executing the pastel upon thick but unsized paper, such as is used in copper-plate printing, and afterwards applying the fixing liquid to the back: it is thus quickly absorbed, without causing any disturbance of colours on the other side. To this must be added, that none but mineral colours should be used, these being the only ones that can combine with the silicates, which have no action on vegetable colours. These rules being observed, the picture will not only resist damp, but will even resist washing with water; acid vapours have no effect upon it; and it will become almost incombustible.

185. *Carved wood Gilding.*—Carved wood is gilded by means of the following process:—Some size is dissolved in water by heat, and a little whiting mixed with it. This composition is brushed over the picture-frame or other article to be gilded. The holes and cracks that may be in it are then filled up with a mixture of the same ingredients in different proportions, and of about the consistence of putty. A composition of the same sort, but containing more whiting than the first, is then brushed over it, and allowed to dry. This is repeated till a sufficient thickness has been laid on. The plain parts are then moistened, smoothed down with a Dutch rush, pumice stone, old file, or anything similar, and the corners and mouldings are squared and shaped by proper tools. A composition similar to the last, but in which yellow ochre is substituted for whiting, is then laid on in a thin coat by a brush. This when dry is again covered by a coating of gold size, a peculiar composition, of which deers' fat is said to form the principal ingredient. This is allowed to dry. The frame or other article thus prepared is placed in a sloping position; its parts are successively moistened with water; gold leaf is laid on them by a "tip" (sort of comb formed by inserting a row of camel's hairs into a card), and is pressed down into the cavities by a dry camel's hair pencil. The gold when dry is burnished in the usual manner by a stone.

Another method is to cover the coating of yellow ochre and size with another of oil varnish, and when this is almost dry, or (as it is technically called) "luggy," to apply the gold leaf, which is pressed down into the mouldings by clean cotton. This is afterwards rubbed over with clean cotton to polish it, and when the varnish is quite dry it becomes very hard and solid.

186. *Crystal Varnish for Maps, Prints, Charts, Drawings, Paper Ornaments.*—Procure a bottle of Canada balsam, draw out the cork, and set the bottle at a little distance from the fire, turning it round several times, until the heat has thinned it; then have something that will hold as much as double the quantity of balsam; carry the balsam from the fire, and, while fluid, mix it with the same quantity of good turpentine, and shake them together until they are well incorporated. In a few days the varnish will be fit for use, particularly if it be poured into a half-gallon glass or stone bottle, and kept in a gentle warmth.

Architectural Glossary.

(*Continued from page* 10.)

Lap. The part of one body which lies on and covers another.

Laquear. The ceiling of any part in architecture receives the name of lacunar only when it consists or compartments sunk or hollowed, without spaces or bands, between the panels; if it is with bands, it is called laquear.

Lararium. In ancient architecture, the apartment in which the Lares or household gods were deposited. It frequently contained also statues of the proprietor's ancestors.

Larmier. A member of the cornice with a broad vertical face, usually of considerable projection.

Lath. A thin cleft piece of wood used in slating, tiling, and plastering. There are two sorts, double and single, the latter being about three-eighths of an inch thick, and the former barely a quarter of an inch. *Pantile laths* are long square pieces of fir, on which the pantiles hang. *Lath bricks* are 22 inches long and 6 inches broad. *Lath floated and set fair* is three coat plasterer's work, in which the first is called *pricking up;* the second, *floating;* the third, or finishing, is done with fine stuff. *Lath laid and set* is two coat plasterer's work, except that the first is called *laying* and is executed without scratching, unless with a broom. When used on walls this work is generally coloured; when on ceilings, whited. *Lath plastered, set, and coloured* is the same as lath laid, set, and coloured. *Lath pricked up, floated, and set for paper* is the same as lath floated and set fair.

Lateral Strength. The resistance which a body will afford at right angles to its grain.

Lattice. A reticulated window, made of laths or strips of iron, separated by glass windows.

Layer. A term in brickwork and masonry, synonymous with the architect's term of *course*, which signifies a continued level range of stones or bricks of the same height throughout the face or faces of a building.

(*To be continued.*)

Correspondence.—"W. J. H."—It is our intention to give, from time to time, designs of the nature alluded to by you.

Grammar of Chymistry.

FOR THE USE OF ARTISTS AND ARTISANS.

CHAPTER VI. (*continued*).—INORGANIC ELEMENTS AND THEIR COMBINATIONS.

Fluorine (symbol F, equivalent 18·70 or 233·8; density, hypothetical, 1292). Hitherto little more has been learned of the substance to which this name is applied, than that it exists and may be isolated. It is most frequently found in the mineral kingdom in combination with calcium; it exists in small quantity in amphibole, mica, and most of the natural phosphates; a trace of it also occurs in the enamel of the teeth and in the bones of animals. Sir Humphry Davy made several attempts to isolate it. By exposing the fluoride of silver in a glass tube to gaseous chlorine at a high temperature, he found that chloride of silver was produced, and fluorine therefore liberated; but it was absorbed and replaced by oxygen, which it disengaged from the silica and soda of the glass. Baudrimont, by passing fluoride of boron over minium heated to redness, first received the gas in a dry vessel; but it was not pure, as hydrofluoric and fluosilicic gases were at the same time evolved. The Messrs. Knox and M. Louyet have separated fluorine from the fluorides of silver and mercury, by treating these bodies with chlorine or iodine in vessels of fluor spar. In the preparation, no doubt was left of the existence of fluorine as a coloured gas. It is of a yellowish brown colour; its odour resembles chlorine and burnt sugar; it bleaches. It does not act on glass, but combines directly with gold.

The compounds of fluorine are hydrofluoric acid, fluoboric acid, and fluosilicic acid.

Hydrofluoric acid, when exposed to the air, flies off in dense white fumes, which consist of the acid vapour combined with the moisture of the atmosphere. Its affinity for water far exceeds that of the strongest sulphuric acid, and the combination is accompanied with a hissing noise, as when red-hot iron is quenched by immersion in water. Of all known substances it is the most destructive to animal matter. When a drop of the concentrated acid, of the size of a pin's head, comes in contact with the skin, instantaneous disorganization ensues, and deep ulceration of a malignant character is produced. It instantly destroys the transparency of glass, heat is evolved, the acid boils, and in a short time entirely disappears. In consequence of its powerful affinity for siliceous matter, hydrofluoric acid may be employed for etching on glass, and when used with this intention, it should be diluted with three or four times its weight of water.

Fluoboric acid is generated by fluorine uniting with boron. It is a colourless gas, has a penetrating pungent odour, and extinguishes flame on the instant. It has a singularly great affinity for water, and most probably owing to this affinity it attacks animal and vegetable matters with energy, converting them, like sulphuric acid, into a carbonaceous substance.

Fluosilicic acid is found whenever hydrofluoric and silicic acids come into contact. It is a colourless gas, extinguishes flame, destroys animals that are immersed in it, and powerfully irritates the respiratory organs. When mixed with atmospheric air, it forms a white cloud, and at the moment of contact with water it suffers decomposition.

(*To be continued.*)

Windows and Window Openings.

By Mr. B. A. C. Herring.

(*Continued from page* 30.)

We know to the contrary: but tell me, are there not many architects who now do little else than copy their designs? Are not many buildings rising around us every day with windows more or less like those, and in many cases, very inferior? The last ten years have, however, shewn much advance in art. I do not wish to abolish Italian architecture. I only wish it to progress. There is progression in Sir Charles Barry's Bridgewater House—the windows there are studies. More originality is perhaps to be found in Mr. Knowles's building at the corner of Chancery Lane—one of the best specimens of modern street architecture. In that building the second floor windows are first-rate.

I will read you an extract which I have made from Gwilt upon the subject of determining the requisite quantity of light necessary to light a room:—

"It is a matter of experience that the greatest quantity of light is obtained for an apartment when lighted by a horizontal aperture in the ceiling. Of this a very extraordinary verification is to be found in the Pantheon at Rome. This edifice—whose clear internal diameter is 142 feet 6 inches, not including the recesses behind the columns—is nearly 74 feet high to the springing of the dome, which is semicircular. The total clear number of cubic feet in it may, therefore, be taken in round numbers at 1,934,460 feet. Those who have visited it well know that it is most sufficiently and pleasingly lighted, and this is effected by an aperture (the *eye*, as it is technically called) in the crown of the dome, which aperture is only 27 feet in diameter. Now the area of a circle 27 feet in diameter being rather more than 572 feet, it follows that each superficial foot of the area lights the astonishing quantity of nearly 3,380 cubic feet. Independent of all considerations of climate, this shews the amazing superiority of a light falling vertically where it can be introduced. But in a majority of cases the apertures for light are introduced in vertical walls, and the consequence is, that a far greater area of them for the admission of light becomes necessary. In considering the question, it must be premised that a large open space is supposed before the windows, and not the obstructed light which it is the lot of the inhabitants of closely built streets to enjoy. Again, it is to be recollected that in the proportioning of windows, it is the apartments on the principal floor that are to be considered, because their width in all the storeys must be guided by them, the only variety admissible being in the height. In this country, where the gloom, and even darkness of wet, cloudy, and foggy seasons so much prevail, it is better to err on the side of too much rather than too little light, and, when it is superabundant, to exclude it by means of shutters and blinds. We are not very friendly to the splaying of windows, because of the irregularity of the lines which follows the practice; but, it must be admitted, it often becomes necessary when the walls are thick, and in such cases a considerable splay on the inside increases the light in effect by a great diminution of shade. It is well, if possible, to have an odd number of windows in an apartment, nothing wherein contributes more to gloom than a pier in the centre.

"We do not think it necessary to advert to the rule of Palladio for the dimensions of windows given in the

first book of his work (chap. 25), because, were it true for the climate of Northern Italy, it would not be so for that of Great Britain; neither are we at all satisfied with that which, in his practice, Sir William Chambers says he adopted, and which is as follows, in his own words:—'I have generally added the depth and height,' we suppose width, 'of the rooms on the principal floor together, and taken one-eighth part thereof for the width of the window—a rule to which there are few objections: admitting somewhat more light than Palladio's, it is, I apprehend, fitter for our climate than his rule would be.' This rule is empirical, as indeed is that on which we place most dependence, and to which we shall presently introduce the reader, being ourselves inclined to the belief that in the lighting a room there is a direct relation between the area of the aperture admitting the light, and the quantity of cubic space in the room. Indeed, the law which we are about to give is one founded on the cubic contents of the apartment; and if the results bore a regular ratio to that quantity the discussion would be at an end, for we should then have only to ascertain the cubic contents; and knowing how much an area of light one foot square would illuminate, the division of one by the other would supply the superficies of windows to be provided. Our own notion on this subject is, that one foot superficial of light in a vertical wall, supposing the building free from obstruction by high objects in the neighbourhood, will in a square room be sufficient for 100 cube feet, if placed centrally in such room. It will, however, immediately occur to the reader that this rule cannot in many cases satisfy the requirements of an apartment as respects the quantity of light necessary for its proper illumination. The subject is beset with numerous difficulties, which to overcome requires the greatest skill. In the case of an apartment, long as compared with its width, it is well known to every practical architect, that windows of the same collective area at either of the narrow ends of such apartment will light it much more effectively than if the same area of light were admitted on either of the long sides; and more especially so, if it should happen that on such long side there were a pier instead of a window in the centre of such side. In illustration of what we mean, let us refer the reader to the Ball Room at Windsor Castle—an apartment 90 feet long, 34 feet wide, and 33 feet high. This room is lighted from the northern narrower side by a window nearly occupying the width, and is supplied by an abundance of light. But had the same quantity of light been admitted from either of the long sides of the room, so many masses of shadow would have been introduced through the interposition of piers, that its effect would have differed most widely from the cheerful and airy aspect it now presents. We have taken this as an example that more presently occurs to us, but the reader, from his observation, will have no difficulty in supplying instances in corroboration of our impressions on this subject.

"But we shall now proceed to give, in the author's own words, the rules of which we have spoken. That author is Robert Morris, and the work quoted is 'Lectures on Architecture, consisting of rules founded on Harmonick and Arithmetical Proportions in Building.' 'There are rules, likewise, for proportioning of light according to the magnitude of the room, by which any room may be illuminated, more or less, according to the uses of them, and at the same time preserve an external regularity, which, as it is on an uncommon basis, I shall explain to you as well as I conveniently can. Let the magnitude of the room be given, and one of those proportions I have proposed to be made use of, or any other; multiply the length and breadth of the room together, and that product multiply by the height, and the square root of that sum will be the area of superficial contents in feet, &c., of the light required.

"Example—Suppose a room whose magnitude is the arithmetical proportion of 5, 4, and 3, and is 20 feet long, 16 feet broad, and 12 feet high, the cube or product of its length, breadth, and height multiplied together is 3,840, the square root of which sum is 62 feet. If the height of the storey is 12 feet, as before mentioned, divide that 62 feet into three windows; each window will contain 20 feet 8 inches of superficial light, and those will be found to be 3 feet 2½ inches broad, and 6 feet 5 inches high, which are windows of two diameters.

"Let us now suppose another room on the same range, whose height is 12 feet, as the preceding example is, and its proportions shall be the cube. The product of that cube is 1,728, and its root is 41 feet 4 inches, or thereabouts; divide that 41 feet 4 inches in two parts for two windows, and each will be 20 feet 8 inches of superficial light, and those will be two diameters in height, and the magnitude the same as the preceding room.

"For example's sake, I will only suppose one more room upon the same range, and 12 feet in height, whose proportion shall be the arithmetical one of 3, 2, and 1; that is, its height being 12 feet, the breadth will be 24, and length 36—the product of those numbers multiplied together will be 10,368, and its root 101 feet 8 inches, or thereabouts; divide this room into 5 windows, each window will have 20 feet 4 inches superficial light, and the magnitude will be near or equal to the other, and if the proportion be 6, 4, and 3, and coved, the light is the same.

"'There is,' says the author, rather perhaps simply, 'but one objection to this rule to make it universal for all kinds of proportioned rooms on the same floor, and that is the square root doth not always happen to be exact enough for to make them all alike; but as the variation will be so small, it may be made use of, and if the area something exceeds the standard of the principal room, that room may be converted to a use which requires more than standard light; and the necessities of families sometimes require it. But, however, the rule will serve for the purpose near enough for any practice.

"If you extend the rule to larger rooms, the same methods will be preserved, even if the height be continued through two storeys, if the upper windows be made square, and to have two tire (tiers) of windows. Let us suppose the room, with two tire of windows in height, to be 50 feet long, 40 feet wide, and 30 feet high, the arithmetical proportion of 5, 4, and 3, the product of those numbers multiplied together will be 60,000, the square root of which sum is 245 superficial feet; divide that sum for the tire of windows into three parts, or take one-third of it, and that makes the attic or square windows 81 feet 8 inches superficial light; divide this into five windows, and they are 4 feet ½ inch square, and the five lower windows consisting of 163 feet 4 inches superficial light, being what remains out of 245 feet, the root; each of these windows is 4 feet ½ inch by 8 feet 1 inch, or two diameters, which 245 feet, the whole sum of the square root of the room, will sufficiently illuminate the same."

(*To be continued.*)

ALPHABET—THIRTEENTH CENTURY.

(For Capitals, see No. 26.)

ACANTHUS MOLLIS (THE SUPPOSED ORIGIN OF THE CORINTHIAN CAPITAL).

Enamel.

ENAMELS are vitrifiable substances, and are usually arranged into three classes, namely, the transparent, the semi-transparent, and the opaque. The basis of all descriptions of enamel is a perfectly transparent and fusible glass, which is rendered either semi-transparent or opaque by admixture with metallic oxides.

White enamels are composed by melting the oxide of tin with glass, and adding a small quantity of magnesia in order to increase the brilliancy of the colour. The addition of oxide of lead or antimony produces a yellow. Reds are formed by an intermixture of the oxides of gold and iron, that composed of the former being the most beautiful and permanent. Greens, violets, and blues are formed from the oxides of copper, cobalt, and iron; and these, when intermixed in different proportions afford a great variety of intermediate colours. Sometimes the oxides are mixed before they are united to the vitreous base.

The principal quality of good enamel, and that which renders it fit for being applied on baked earthenware, or on metals, is the facility with which it acquires lustre by a moderate or cherry-red heat, more or less, according to the nature of the enamel, without entering into complete fusion. Enamels applied to earthenware and metals possess this quality. They do not enter into complete fusion; they assume only the state of paste, but of a paste exceedingly firm; and yet when baked one might say that they had been completely fused. There are two methods of painting on enamel: on raw or on baked enamel. Both these methods are employed, or may be employed, for the same object. Solid colours, capable of sustaining the fire necessary for baking enamel ground, may be applied in the form of fused enamel on that which is raw, and the artist may afterwards finish with the tender colours. The colours applied on the raw material do not require any flux; there is one, even, to which silex must be added, that is, the calx of copper, which gives a very beautiful green; but when you wish to use it on the raw material you must mix with it about two parts of its weight of silex, and bring the mixture into combination by means of heat. You afterwards pulverise the mass you have thus obtained in order to employ it. To obtain good white enamel, it is of great importance that the lead and tin should be very pure. If these metals contain copper or antimony, as is often the case, the enamel will not be beautiful. Iron is the least hurtful to its appearance.

All the colours may be produced by the metallic oxides. These colours are more or less fused in the fire according as they adhere with more or less strength to their oxygen. All metals which readily lose their oxygen cannot endure a great degree of heat, and are unfit for being employed on the raw materials.

Grammar of Chymistry.

FOR THE USE OF ARTISTS AND ARTISANS.

CHAPTER VI. (*continued*).—INORGANIC ELEMENTS AND THEIR COMBINATIONS.

Bromine (symbol Br, equivalent 78·39; density, 5393). Bromine or brome is so termed from the Greek word βρωμος, signifying a strong or rank odour. It is an essential ingredient of the saline matter of the ocean; for it has been detected in the waters of the Mediterranean, Baltic, North Sea, Frith of Forth, in the waters of the Dead Sea, in a variety of salt springs in Germany, and in several mineral springs in England. It exists in marine plants, in sea-weeds, and in one of the testaceous mollusca. It is found principally in solution, and is usually extracted from bittern. Although it has not been found applicable to any important purpose of utility, it is interesting from its chymical relations, particularly from the extraordinary parallelism which it exhibits in properties with chlorine, of which family it is a member. It forms a combination with starch, and acts as a caustic on the skin, which it stains yellow, like nitric acid. Many metals combine with bromine with ignition. It eliminates oxygen in the form of *hydrobromic acid*. Its other compounds are, *bromic acid*, *chloride of bromine*, *bromide of iodine*, *bromide of sulphur*, *bromide of phosphorus*, and *terbromide of silicium*.

Silicium (symbol Si, equivalent 21·35; density of vapour, 1475). Silicium is the undecomposed base of silica. There are several processes of obtaining it, but the best seems to be to heat the double fluoride of silicium and potassium with 8 or 9-10ths of its weight of potassium. In its pure state silicium is a dull brown powder, which inflames and burns when heated in air or oxygen.

Silicic acid. The only oxide of silicium is silica or silicic acid, which constitutes nearly in a state of purity rock crystal, quartz, flint, sandstone, the amethyst, chalcedony, cornelian, agate, opal, and other minerals. Silica is a white tasteless powder, extremely mobile when heated, and, at a high temperature, thrown out of a crucible by the slightest breath of wind. It fuses before the hydro-oxygen blowpipe with greater facility than lime or magnesia, and is quite insoluble in water, though Berzelius has shewn that if presented to water while in the nascent state, it is dissolved in large quantity.

On igniting one part of silicic acid with three of carbonate of potassa, a vitreous matter is formed, which is deliquescent, and may be dissolved completely in water. But if the proportion of silicic acid and alkali be reversed, a transparent brittle compound results, which is insoluble in water, is attacked by none of the acids excepting the hydrofluoric, and possesses the well-known properties of glass. Every kind of ordinary glass is a silicate, and all its varieties are owing to differences in the proportion of the constituents, to the nature of the alkali, or to the presence of foreign matters.

Silica is seldom sufficiently pure for the manufacture of the finest colourless gas. Rock crystal is frequently used for those glasses which are employed as pigments by glass painters; but sand is the most general and economical source of silica, and the great variations in its purity render a careful selection necessary for the

different kinds of glass. Sand contains either oxide of iron, clay, or lime, and generally all three substances are present, one of which preponderates and gives a character to the sand, which is also mixed with vegetable remains. Lime is harmless. Clay can be removed entirely by washing and decantation without any great expense; and the oxide of iron, which is much more difficult of management, can indeed be completely and easily removed by washing with muriatic acid; but the operation is attended with too great expense, and glass makers prefer seeking out sand free from iron, which they get chiefly from Sydney and New Holland; the excellent sand for glass-making at Leighton Buzzard, and St. Helen's, in Lancashire, not proving sufficient for the demand, nor the deposits of sand in Norfolk, and in Alum Bay, in the Isle of Wight.

(To be continued.)

The Origin of the Corinthian Column.

The origin of the adoption of the Corinthian column is accounted for by an incident preserved to us by Vitruvius, and if it be not authentically true, yet it deserves, as the Italians say, that it should be so. The story is interesting, not only as an artistical tradition, but equally so from the main incident being connected with a custom prevalent among the ancients, and still extant among us moderns, chiefly the French and Germans, of placing on the tombs of the dead, fruits, flowers, and other pleasant objects as offerings to the shades of the departed, or as affectionate tokens of regretful remembrance. As a tribute of this interesting nature, a nurse of Corinth (so runs the tale), placed a small wicker basket filled with fruits, near the tomb of a little child, and as a precaution against its being displaced, or its contents being plundered by the birds, deposited on it a large flat tile. This mortuary tribute chanced to be placed exactly at the root of an *acanthus mollis*, or *spinosa acanthus*, better known as the prickly dockplant, which, in the course of time, burst forth and spread its leaves in fantastic and luxuriant convolutions around the weighted basket which obstructed its growth. The leaves and flowers, depressed in the centre, grew up in graceful convolutions around it, while the tips of the leaves and flowers, resisted by the angles of the tiles, were pressed back, and convolved in the form of volutes. While the basket was thus decorated and the plant in its full luxuriance of growth, Callimachus, the famous Athenian sculptor in marble, happening to pass by the tomb of the child, was struck with the elegant appearance of this beautiful natural object. On the spot he resolved to make it applicable to a new species of order in architecture: and it was thus, that with his inventive genius, he adapted and modified his discovery. The angular flowers were formed into the *helices* of the capital, the central leaves into the *caulicoles*, the basket into the *campana*, and the tile into the *abacus*. The new design, being greatly admired, became the leading feature in the architectural decorations of the ancient Greeks; and truly, than this celebrated acanthus leaf there is no ornament more fitted, from the graceful convolutions of its outlines, the luxuriance of its foliage, and the breadth of masses in its lights and shadows, to give enrichment to the capitals of architectural pillars.

Technicologia.

187. *Cement for Wood and China.*—Common glue is well known to be soluble in water, and that after any length of time has elapsed since its first application; those articles, therefore, which are glued together are only such as are ordinarily to be kept dry, lest the moisture to which they may be exposed should dissolve the glue which unites their various joints, and they, consequently, fall to pieces. The only preventative of this effect has hitherto consisted in laying on a coat of varnish, in order to keep off the wet. There are very many cases in which glue would be used were it not for this solubility, such for example, as vessels to hold hot or cold water, furniture for sea use, where it may be exposed to a damp atmosphere, show-boards for houses, external shutters and doors, and numerous other pieces of workmanship. It is somewhat surprising, therefore, that no attempt should have been made in this country to bring into general use the famed "cheese glue" which is employed on the Continent in most of the before-mentioned cases with complete success. It is known indeed, as a cement for joining china, glass, and, we believe, is the same as Vaucouvier's cement, which is sold at a very high price for that purpose. It is certain at least, that such articles may be joined together with it, so as to have a neat joint, and to resist the ungenial degrees of temperature to which they are generally exposed, as well as the action of water, acid, &c. From this latter property it may also be useful for joining broken galvanic troughs, &c. Applied to wood, it is extremely tenacious and equally resisting. The following is the receipt:—

Take some fresh cheese, made with rich cream milk (Cheshire cheese will do); pound it and wash it in warm water, until all the soluble parts are carried off by the water; this latter process may be performed in a sieve or linen cloth, through which the cheese must be afterwards passed, in order to get rid of the water. When quite drained, it crumbles like stale bread, and is then dried upon unsized paper, in which state it will keep fresh a very long time.

This material, which is caseum mixed with a small proportion of butter, is not soluble in water except by the addition of quicklime, but by pounding this with the mixture it becomes transformed into a very viscous sort of cheese which can be diluted with water to the consistency required for the work. It dries quickly, and when dry it cannot again be dissolved, therefore no more should be prepared at any one time than can be immediately used. This is one of the reasons why it has hitherto been so little used. The trouble and difficulty would be greatly diminished by keeping in a well closed vessel some powdered quicklime to mix with the caseum at the time of pounding. It would be still better to soften the caseum in hot water, and, for expedition's sake, the two substances should be kept in a close vessel, being previously mixed dry and reduced to a fine powder. It is applied in the same manner as common glue.

The above receipt was known to the ancients, even, it is supposed, in the time of the Greeks; and during the flourishing age of the Italian school of painting it was commonly employed to join together the various parts of panel boards.

188. *To Fix Pencil and Chalk Drawings.* — For pencil drawings, a thin solution of isinglass answers the purpose. It should be allowed to run over the drawing, or be very carefully applied with a soft camel's-hair pencil. For chalk drawings, make a thin solution of size, put it in a flat dish, pass the drawing from one side to the other under the liquid, taking care that the liquid comes in contact with every part of it. The friction of a camel's-hair pencil would injure the drawing. When it is completely wetted, fasten it to the edge of a table or to a string, by means of two or three pins, until dry. Crayon or charcoal drawings would be spoiled by this process, and for fixing them the paper should be washed over with a solution of size in the first instance. When quite dry, the surface is in a good state for making the drawing—after which it should be inverted and held horizontally over steam. The steam melts the size, which absorbs the charcoal or crayon, and when it has again become dry the drawing is fixed. This process may be repeated several times during the progress of a drawing, the effect being increased each time.

189. *To Stain Ivory Yellow.*—Put a quarter of a pound of alum in a pint of water, boil the ivory in the solution, then boil it in a decoction of turmeric.

A METHOD FOR DRAWING THE FLUTES AND FILLETS ON A COLUMN OR PILASTER.

FIG. I.

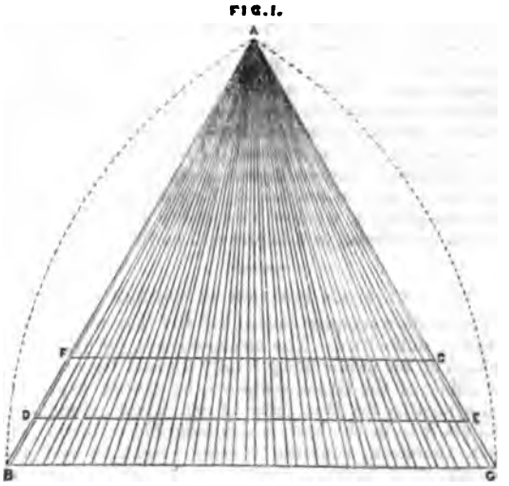
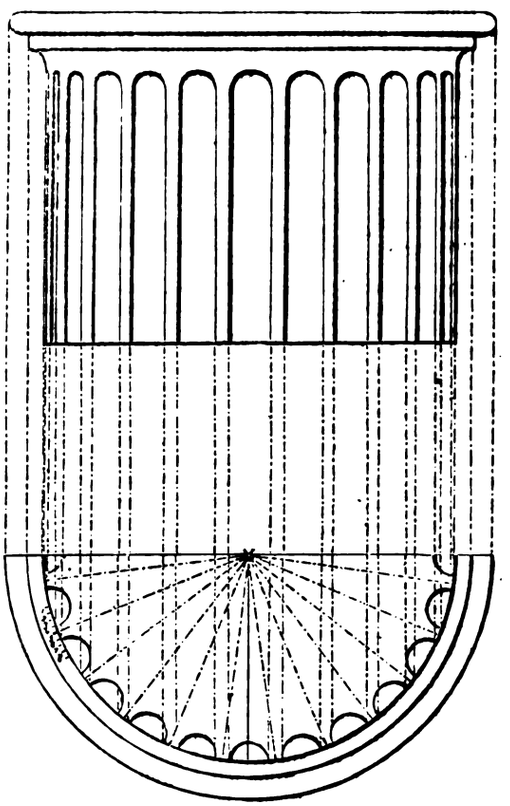


Fig. 1.—B C is any line divided into flutes and fillets, greater than the circumference of the column at the base; on B C describe the equilateral triangle A B C, draw all the points in B C to A, then if A D and A E are equal to the circumference of the column at the bottom of the shaft, the line D E will be equal to the same circumference; lay a piece of paper on D E, and mark the flutes and fillets upon it; then apply it round the column at the bottom, and prick them round it, divide the circumference at top in the same manner as F G, and draw the flutes as before.

DIAGRAM SHEWING THE METHOD OF PRODUCING THE FLUTES AND FILLETS ROUND THE IONIC COLUMN.



EARLIEST KNOWN PRINT.

The earliest engraving hitherto known, which represents St. Christopher, bearing the infant Jesus on his shoulders, is marked with the year 1423; but an accident has carried this date five years backward. A person at Malines, who was about to burn an old chest which contained a quantity of mouldy papers, perceived, pasted on the inside of the lid, a print which had become very obscure from dirt and age. Another person was present who had a knowledge of prints, and who carefully took off the fragments; and, having united them again, found clearly marked the date of 1418. This rare specimen, which belongs to the Flemish school, was purchased for the Royal Library at Brussels, at the price of 500 francs. A copy of this is to be found in Jackson's "Treatise on Wood Engraving." This engraving therefore, it will be perceived, was executed half a century prior to the introduction of printing into this country by Caxton, a copy of whose "History of Troy" was sold at the sale of the Duke of Roxburgh's books for £1,060.

Windows and Window Openings.

By Mr. B. A. C. Herring.

(*Continued and concluded from page* 36.)

I consider that many of these remarks are useful, but we must not generally be over exact as to calculations for light: our experience is sufficient to guide us on this point. The architectural treatment of our windows is a thing often neglected. We have two things to study—viz., utility and beauty. A window is only useful when we can benefit by its use; thus I am at a loss to know why the present Gothic architects will insist upon giving us a quantity of stone mullions, in our domestic windows, which ought to be made not only to admit light, but likewise to enable us to see external objects with facility, and with as little interruption as possible.

In ecclesiastical architecture and public buildings where the windows are only used for the admission of light and to be looked at only, instead of being looked out of, there let Gothic tracery be used in all its forms. The only really comfortable and useful domestic Gothic windows are to be found in the Venetian-Gothic, where a large window is divided into two or more lights by a thin shaft only, and the smaller-sized windows not cut up at all. Depend upon it that this style, although a picturesque one, is one which, properly worked out, would answer admirably in street architecture, and far better than our English Gothic. For an example, look at Messrs. Deane and Woodward's elevation of the Crown Insurance Office in Bridge Street, Blackfriars. That front works in with the neighbouring fronts better than I ever saw an English Gothic front look when surrounded by a number of incongruous buildings. We often do not beautify our windows as we ought, at times letting them be almost plain openings, and at other times—shall I say it?—daubing a lot of cement round them, to make people believe that they are handsome. Happily, architects are fast washing their hands of this practice, and soon the speculative builder will have this exquisite mode of decoration left entirely to himself.

Why should we not use coloured bricks for our window decoration? Much is to be done in them; and then there is terra-cotta—a beautiful material. Architects may say that they cannot get them easily; it is an excuse only. Give manufacturers the chance, and you will soon have all you want for such purposes.

I wish to say one or two words on the shape of domestic windows. Let the basement windows be as wide as possible for the admission of light; generally a good segment arch is the best form for the head, with all the architecture of the revels and sides of a substantial character; the ground floor windows will always look well to be of the arched form about the head, and generally massive. When you get up higher and reach the other storeys, keep lighter with all details, and introduce, for variety, couplet and other windows over the wider single openings of the ground floor. If you do not use stone, never think of anything but the arch for window-heads—either segmental, round, or pointed; never have recourse to such false construction as a straight brick arch. Shop windows are the ones that of all windows are generally the ugliest, made for the sake of displaying the proprietor's goods; architecture is in them almost always consigned to oblivion. I will exonerate architects from blame on this point, for I believe they cannot help it, as the shopkeeper considers money before taste; but whenever they do have a chance, I hope they will endeavour to remove the frightful feeling produced of seeing a house front apparently standing entirely on glass. A word about dormer windows, and then we must say something about sashes and glazing, and then conclude.

Dormer windows do not appear to have been used before the fourteenth century, and did not come into extensive use until the reign of Elizabeth, when they were very picturesque features; and I want to know why we do not more often use them now? There is many a house that has much waste room in the roof; and this is occasioned by the idea that a dormer window is ugly. No such thing—it is a rational means of embellishing our roofs, instead of putting a great parapet or balustrade course to hide them.

Are the sashes with which we fill our window openings all that can be desired? I am sure you will agree with me in saying that they are not. Why should we be always reproducing the upright and horizontal bar, cutting up our window glass so nicely and methodically into squares, like a chess-board? Now, then, Gothic gentlemen, give us a little of your experience, and see if you cannot give us something original for this purpose; not great heavy mullions—that won't do—but give us some nice delicate joiners' work, of form that will look well and not impede light. We have every facility for glazing our sashes: and this, I think, we almost always do well. However, I must take objection to lead lights filled in with glass quarries, as used for our churches and schools. The love of ancient art ought not to blind us in this respect; our forefathers used this way of glazing, because it was the most convenient for them; and they had not the advantage of such materials as we have. Then let us keep time with invention, and use glass in such ways as may appear most in accordance with its improved manufacture. I may say—although most likely many will differ from me—that rough plate, in large squares, looks exceedingly well for ecclesiastical buildings when stained glass is not used. For domestic windows, let me recommend Bowden's crystal cut glass when obscure glass is required. I have now briefly, and very unsatisfactorily to myself, given you a few of my own views; and, in conclusion, I would say, remember, when designing a window, that utility and beauty must be both considered, or a failure will be the result.

THE SCULPTOR'S POSITION IN MODERN TIMES.

The modern sculptor cannot but feel that his position is full of difficulties. The circumstances, the habits, the feelings of his public being totally distinct from those of the public of the Greek sculptors, he cannot expect to find sympathy for that *form* of art, which, though he believes it to be the best, is unintelligible to them. He must, therefore, conform to some extent, to local and contemporary feeling; and it is in the measure or degree of this, that he may shew his true feeling for his art. Obstinately to insist on reproducing Apollos and Venuses because the ancients did it, is proof neither of very great ability nor wisdom; but an able artist of good sense will know that a figure need not necessarily be naked and Greek to be beautiful; but, with a true feeling for beauty, acquired in this best of all schools, the antique, and the refinement which a careful study of the *spirit* which animates it is sure to impart to its own productions, he may always, more or less, ennoble and adorn subjects which, to ordinary minds, would appear incapable of receiving such refinement.

ECCLESIASTICAL EMBLEM.

BELIEVE

in God the Father Almighty, Maker of heaven and earth:

And in Jesus Christ his only Son our Lord, Who was conceived by the Holy Ghost, Born of the Virgin Mary, Suffered under Pontius Pilate, Was crucified, dead, and buried, He descended into hell; The third day he rose again from the dead, He ascended into heaven, And sitteth on the right hand of God the Father Almighty; From thence he shall come to judge the quick and the dead.

I believe in the Holy Ghost; The holy Catholick Church; The Communion of Saints; The Forgiveness of sins; The Resurrection of the body, And the life everlasting.

AMEN.

The Value and Purpose of Decorative Design.

PERCEIVING in a national point of view the benefits which would surely accrue to this country from the extension of artistic education, we cannot at the same time fail of being struck with the vast quantity of evidence that can be brought to bear upon the subject. Independent of a positive improvement in public taste, and the more general appreciation of works of art, which would certainly ensue from the wide diffusion of those stamped with the recommendation of intrinsic merit, the amount of money that could be annually circulated exclusively in England, without allowing it, as at present, to go to the artists and artisans of continental countries, would be so immense as to fully recompense, in the course of a very few years, the pecuniary outlay originally made in effecting it. In Ireland and Scotland also, the same end might be easily attained by the same means; and who shall say that such a one is not desirable, when he learns that, in Glasgow alone, a sum of no less than £5000 is annually paid by persons engaged in various pursuits to parties in France for designs?

With regard to her amount of native genius and ability, England is secondary to none of her neighbours—with regard to invention, she stands unrivalled. With qualities such as these, it is hard to account for the anomaly exhibited in her deficiency in respect to original designs—it cannot be that the faculty of making them is peculiar to certain countries, and is entirely wanting in this one: such a supposition would be unjust; and, if universally accredited, injurious; for the direct contrary is really the case, in proof of which we may adduce the opinion of every received authority upon the matter.

The fact is, that a little trouble is alone requisite in order to develope popular feeling; that once gained, success is certain, as taste can never be exterminated, although it may be rendered dormant by lassitude and long inattention. Let us take other nations as models in point of *cultivation*, and let some adequate encouragement be held out for the production of designs. *This* is the only efficient plan, and as such it ought to be followed.

Decoration is an art which comprehends within itself the power of effecting much that is good—good in whatsoever point we may look at it—whether as an incentive or aid to cultivated taste and moral refinement, or as a means of affording to genius a suitable and remunerative employment. In either of these respects its efficiency is undoubted; and it only remains, by putting the theory into practice, to ensure a national advantage, and one that, besides yielding a remuneration, will reflect everlasting honour upon a country which had the good sense to appreciate its value.

For ourselves, we earnestly look forward to the day when the spirit of Interior Decoration will have spread its influence over the palace and the cottage; when the humble walls of the poor man will exhibit taste as well as the gorgeous ones of the prince; in short, when, by the judicious influence of education and attention, we shall be able to compete, in respect to Decoration, with the most celebrated nations of antiquity in their palmiest days!

Architectural Glossary.

(*Continued from page* 34.)

PARTY WALLS. Such as are formed between houses to separate them from each other, and to prevent the spreading of fire. *Party Fence Wall.*—A wall separating the vacant ground in one occupation from that in another.

PARVIS. A porch, portico, or other large entrance to a church.

PATERNOSTERS. Ornaments shaped like beads used in baguettes, &c.

PEDESTAL. The lowest division of a column, and consisting of three parts, the cornice, the die, and the base.

PEDIMENT. The triangular crowning part of a portico.

PENDENT. An ornament suspended from the summit of Gothic vaulting, used very frequently to timber framed roofs.

PENDENTIVE. The entire body of a vault suspended out of the perpendicular of the walls, and bearing against the arch boutants or supporters. *Pendentive Bracketing* or *Cave Bracketing.*—That springing from the rectangular walls of an apartment upwards to the ceiling, and forming the horizontal part of the ceiling into a circle or ellipse.

PERPEND STONE OR PERPENDER. A long stone reaching through the thickness of the wall, so as to be visible on both sides, and, therefore, wrought and smoothed at the ends.

PERRON. A staircase lying open or without side a building, more correctly when leading to a first storey.

PIAZZA. A square open space surrounded by buildings (so that "piazza" as applied in Covent Garden Market to denote the "walk under the arcade," is an ignorant term).

PILASTER. A square column, sometimes insulated, but most frequently engaged in a wall.

PINNACLE. An apex usually applied to the ornament in Gothic architecture placed on the top of a buttress.

PITCH. The angle which a gable end is set to.

PITCHING PIECE. In staircasing, a horizontal piece of timber, having one of its ends wedged into the wall at the upper part of a flight of steps, to support the upper ends of the rough stringa.

PLANCEER. The under surface of the corona; any sofit.

PLANK. A name given to all timber, except fir.

PLATBAND. Any square moulding with little projection. When a door or window is made square, and not arched, the lintel is the platband.

PLATE. Pieces of timber lying horizontally on a wall for the reception of girders, joists, and other assemblage of timber.

(*To be continued.*)

Grammar of Chymistry.

FOR THE USE OF ARTISTS AND ARTISANS.

CHAPTER VII.—METALLIC BODIES, THEIR DISCOVERERS, AND THEIR CLASSIFICATION.

There are fifty metallic elementary substances, all of which are brilliant, electropositive, and heavier than water, except potassium and sodium.

Only seven of these bodies were known to the ancients, viz., gold, silver, iron, copper, mercury, lead, and tin. Not till towards the close of the 15th century was an eighth metallic element known—antimony, which was first discovered in 1490 by Basil Valentine. Forty years after, Agricola described bismuth. Zinc was first mentioned by Paracelsus in the 16th century. In 1733 Brandt discovered arsenic and cobalt. Eight years after platinum was made known to the world by Wood, the assay master of Jamaica. In 1751 Cronstedt discovered nickel; in 1774 Gahn and Scheele manganese; and in 1781 D'Elhuyart tungsten. Tellurium, a metal of rare occurrence, which appeared at one time to be almost confined to certain gold mines in Transylvania, was first described in 1782 as a new metal by Klaproth, who gave it the name tellurium, from *tellus*, the earth. Closely allied to tungsten is molybdenum, which was first obtained in the same year by the Swedish chymist, Hjelm, from an acid formed in 1778 by Scheele from plumbago—hence the name; molybdenum being derived from the Greek term for plumbago. In 1789 uranium was discovered by Klaproth, and in 1791 titanium by Mr. Gregor, of Cornwall. Tantalum appears to have been first observed in 1801 by Mr. Hatchett, in a black mineral belonging to the British Museum, and supposed to have come from Massachusetts in North America, and was named columbium on that account. Chromium, so remarkable for the variety and beauty of its coloured preparations, was discovered four years before by Vanquelin, in the red mineral now known as chromate of lead. Palladium was discovered in 1803 by Dr. Wollaston, and the same chymist in the same year discovered rhodium in the ore of platinum. The black scales, which remain when native platinum is dissolved in aqua regia, were discovered in 1803, by Mr. Smithson Tennant, to contain iridium and osmium. Cerium was named in 1804 from Ceres by its discoverers, Hisinger and Berzelius. Everyone acquainted with the history of chymistry knows how, in 1807, Sir Humphry Davy made five memorable discoveries. By a powerful voltaic battery he resolved potash into potassium, and soda into sodium. He obtained barium, the metallic basis of barytes, by the voltaic decomposition of moistened carbonate of barytes in contact with mercury; and he also got evidence of the existence of strontium and calcium. In the process of reducing ores of zinc, Stromeyer discovered cadmium in 1818; and in the same year Arfwedson, decomposing a rare alkaline oxide, lithia, discovered lithium. Berzelius, in 1824, first obtained zirconium from the peculiar white earth named zirconia. Four years after, Wöhler isolated from their chlorides the metals aluminium, glucinium, and yttrium. Magnesium, a metal of the colour and lustre of silver, was discovered by Bussy in 1829; and in the same year Berzelius discovered the element thorium in a rare black Norwegian mineral, like obsidian, now called thorite, which had been brought from the coast of the North Sea. In the iron prepared from the iron ore of Taberg, in Sweden, Sefström discovered vanadium in 1830. Twenty years ago, the oxide commonly considered as oxide of cerium was shewn by Mosander to contain a large proportion of the oxide of a new metal, to which he gave the name of lantanum (from the Greek verb λανθανω, *I lurk*, it having lain concealed in the ores of cerium). The last researches of the same eminent chymist have demonstrated the existence in the ores of cerium, as well as in those of yttrium, of another new metal, to which he has given the name of didymium. He has also given the names of terbium and erbium (derived, like yttrium, from Ytterby, the locality where the mineral gadolinite occurs) to two other new metals, the oxides of which accompany yttria. Berzelius always denied the identity of columbium and tantalum, and the recent researches of Rose have shewn that the ores contain two analogous metals. One of these, when purified, retains the name of tantalum, and the other is called by Rose niobium, from Niobe, the daughter of Tantalus. The discovery of niobium led to the discovery, in the same ores, of another metal, named pelopium, which was announced by Rose about the same time with niobium. Another late discovery has been ruthenium, by Claus, in the insoluble residue of the ore of platinum. Osann, a good many years before, had given that name to a supposed new metal which he believed to exist in the ore of platinum; and Claus, who had studied it and demonstrated its existence, has retained the name proposed by Osann. Twelve years ago Swanberg announced that the zircons of Norway contain, besides zirconia, a new earth, noria, the oxide of a new metal, norium. The fiftieth metal is ilmenium.

The metals may be divided into two grand classes: those which by oxidation yield alkalies and earths, and those the oxides of which are neither alkalies nor earths. These two classes may be again subdivided, each into three groups. The first group of the first class comprises the metallic bases of the alkalies, 3—

Potassium,
Sodium,
Lithium.

Group II.—The metallic bases of the alkaline earths, 3—

Barium,
Strontium,
Calcium.

(These six metals have such a powerful attraction for oxygen, that they absorb it at all temperatures, and at all temperatures decompose water—even ice at the moment of contact.)

Group III.—The metallic bases of the earths, 7—

Magnesium,
Aluminium,
Thorium,
Glucinium,
Zirconium,
Yttrium,
Silicium.

(These absorb oxygen at high temperatures, and never decompose water at temperatures below (according to Fahrenheit's thermometer) 122 degrees.

Group I. of Class II.—Metals which decompose water at a red heat, 7—

Manganese,
Zinc,
Iron,
Tin,
Cadmium,
Cobalt,
Nickel.

Group II. of Class II.—Metals which do not decompose water at any temperature, and the oxides of which are not reduced to the metallic state by the sole action of heat, 17—

Arsenic,	Tellurium,
Chromium,	Copper,
Vanadium,	Lead,
Molybdenum,	Erbium,
Tungsten,	Terbium,
Columbium,	Didymium,
Antimony,	Lantanum,
Uranium,	Niobium,
Cerium,	Ilmenium,
Bismuth,	Pelopium.
Titanium,	

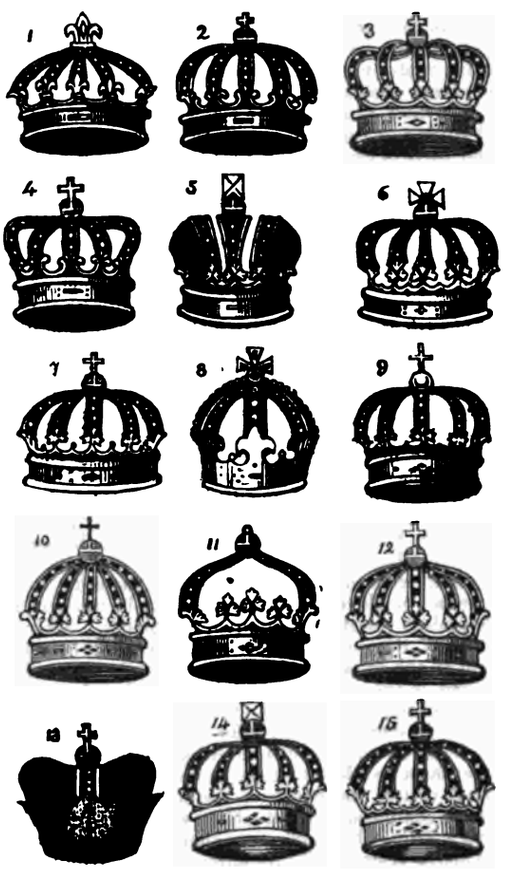
Group III. of Class II.—Metals which part with oxygen at high temperatures—

Mercury,	Rhodium,
Silver,	Osmium,
Gold,	Iridium,
Platinum,	Ruthenium.
Palladium,	

(To be continued.)

Crowns and Coronets.

There are no authentic sources from which any material information can be derived with respect to crowns and coronets. They were used, however, in the remotest times, for they were worn by the high priests of the Jews and by the chiefs of other Eastern nations. The Roman emperors also girt their heads with crowns adorned with gold and precious stones, and that same ancient people gave crowns to victorious generals. Now-a-days crowns are worn only by European sovereigns, and are all of different forms. The tiara of the pope is a triple crown, and the crown of Lombardy has always been called the Iron Crown. The crown of England, which is represented in the above engraving, rises from a circlet of gold surmounted by ermine, from which is erected a solid band of gold, ornamented with the well-known valuable state jewels. Above this is a superstructure of gold and diamonds in the form of alternate Maltese crosses and fleurs-de-lys (a memorial of the old title claimed by the Plantagenets to portions of France), encircling a crimson velvet headcap. At the top of the diadem, supported by lateral bars of gold and pearls, rest the orb and cross, the originals of which are borne by chief officers of state upon the coronation of the sovereign, so carrying out the solemn obligations which upon these symbols the monarch always pledges faith to the nation for the guardianship of liberties at the solemn moment of consecration to responsibilities of such a character.



The crowns of the other sovereigns of Europe shewn in the engraving, are—1. France; 2. Spain; 3. Portugal; 4. Denmark; 5. Russia; 6. Prussia; 7. Poland; 8. Bohemia; 9. Sardinia; 10. Sicily; 11. Holland. 12. Orange; 13. Hanover; 14. Hungary; 15. Sweden.

(To be continued.)

Technicologia.

190. *Soluble Glass.*—Supposing the materials to be pretty pure, which they ought to be, take of quartz powder fifteen parts, carbonate of soda in powder ten parts, charcoal powder one part (all by measure), mix well, and melt them together (in a crucible, or any pot that will stand a great heat), exposed to strong heat until the whole has melted into a homogeneous mass.

This point being obtained, take out the contents, put them on a clean stone slab or iron sheet, and allow to cool. This is silicate of soda in its crude state, and has the following properties:—The mass, when cold, has generally blisters, is of a blackish gray colour, is nearly as hard as common glass, is transparent at the edges, and sets when exposed to the air slightly and slowly moist, but the carbonic acid of the air affects the same in this state but little. All these properties are common to the three different kinds of silicates; silicate of potash may be prepared in precisely the same way, using twelve parts of pure carbonate of potash instead of eleven of carbonate of soda.

The best proportions to make the double water-glass or silicate or soda and potash on a large scale, are fifty-four parts of carbonate of soda in powder, seventy parts of carbonate of potash, 192 parts of silica or quartz sand, and eighteen parts of charcoal powder, all by measure, mixed well together and exposed to strong heat, as before directed. This latter compound contains a greater proportion of silica with the same degree of solubility in boiling water as the other two, and the solution of it is to be preferred for treatment of bodies with large pores, or of such as can take up large quantities of solution.

In order to obtain from the above substance the solution, pound the glass to powder; and add to five parts of clean boiling water (distilled or filtered river water) one part of the powder (by *weight*) little by little, under constant stirring, and continue boiling and stirring until the whole of the powder is dissolved, which ought to take place in from three to five hours. If dissolved earlier than in three hours' boiling, then the carbonates in the water-glass are in proportion greater; if more than five hours is required, it will never quite dissolve, and the silica is in excess. The proportions given vary a little, according to the purity or impurity of the materials employed. The solution may be made in any convenient vessel of clay, iron, or copper. After the whole of the powder is dissolved, a skin will be seen to form on the surface, which melts instantly again if immersed in the solution, which is a sign that the solution is of the strength from 30 deg. to 33 deg. on Reaumur's scale. If, during boiling, before the whole of the powder is dissolved, too much water has evaporated, boiling water must be added to keep up the original quantity of water. After the powder is dissolved, the boiling may also be continued, without adding water, until the whole form a *jelly*, which indicates about 66 deg. strength on the above scale. Jelly is, however, only required for cementing articles, and the solutions used for other works are more economically obtained from the solution of 33 deg. After the desired point is obtained, the boiling must be stopped, and the solution must be allowed to settle and to cool, after which the clear solution must be drawn off and kept in well-stoppered vessels; the little flaky sediment at the bottom must be kept separate, and may be used in making mortars, and for other works, where the dark colour it has does not impure the work.

The above-given solution and jelly are, for most purposes, too concentrated, and require to be diluted; the more concentrated solutions must be used first, and for such substances as can take up a large quantity at first; and, as the saturation of the pores progresses, the more diluted solutions have to be used. Every object to be treated with water-glass must be free from dust and grease, and, above all, quite dry; and every coat or application of water-glass must be allowed to dry and harden well before another coat is applied.

Also, the operation is only to be undertaken in warm and dry weather, or heated localities.

Some subjects may require only three coatings, or rather applications, others as much as eight, before the pores are perfectly closed; and unless this be the case, the desired object will not perfectly be obtained; but in no instance should any of the solution be allowed to remain unabsorbed on the surface of the article. If too much, or a too concentrated solution has been applied, the surplus must be wiped off with a damp cloth or sponge. The changes which the substance undergoes after application to wood, for instance, are of a physical and of a chymical nature; the solution enters into chymical combination with the matter of the wood, and two parts of the carbonates are expelled in the shape of efflorescence; these, where they appear, must be removed with a damp sponge, and are a sign that the process is going on favourably. Now, by treating wood which is not thoroughly dry, it would be to enclose the element of destruction (moisture) instead of excluding the same. Objects, when complete, should not be exposed to wet and rain for a considerable time, or not before the water-glass in the pores has reached the insoluble state; if this is neglected, disappointment is pretty sure. It is difficult to say how much time should be allowed to elapse between each application, as it depends so much on the strength of the solution used, and more so on the state of the atmosphere, thirty-six hours may be enough in one case, and as many days may be required in another.

The average standard of strength of the solutions are as follows, taking the solution of 33 deg. as number 1 or normal solution.

No. 1. Solution for the first coat of very porous objects.

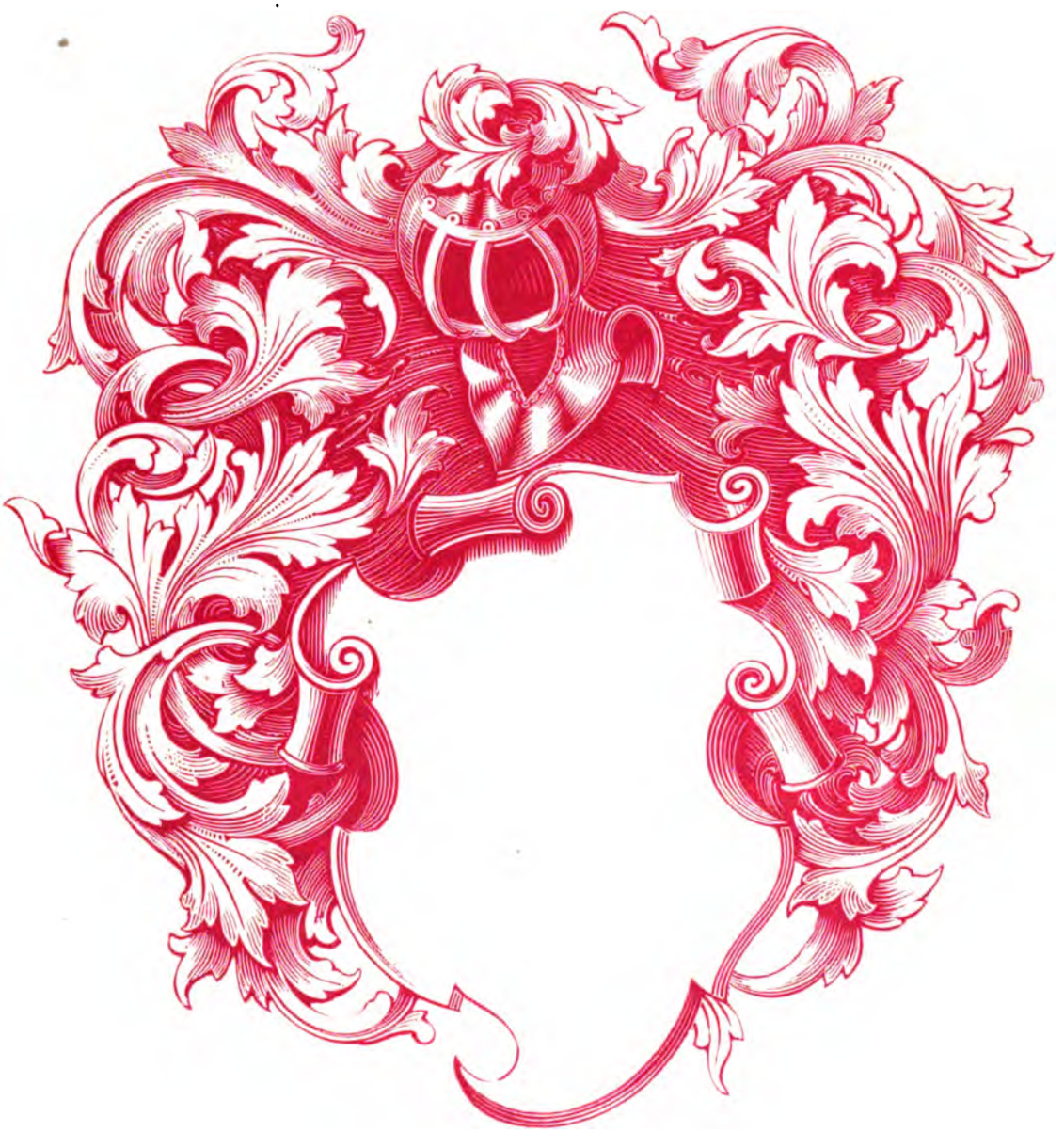
No. 2. One part of No. 1 to be diluted with an equal quantity of water used for less porous objects and for a second coat of porous objects.

No. 3. One part of No. 1 solution to be diluted with two parts of water used for second and third coatings and for the first coating of same objects.

No. 4. One part to be diluted with three of water, used for first coating of metal and such like objects, and for the fourth, fifth, and sixth coatings of porous objects.

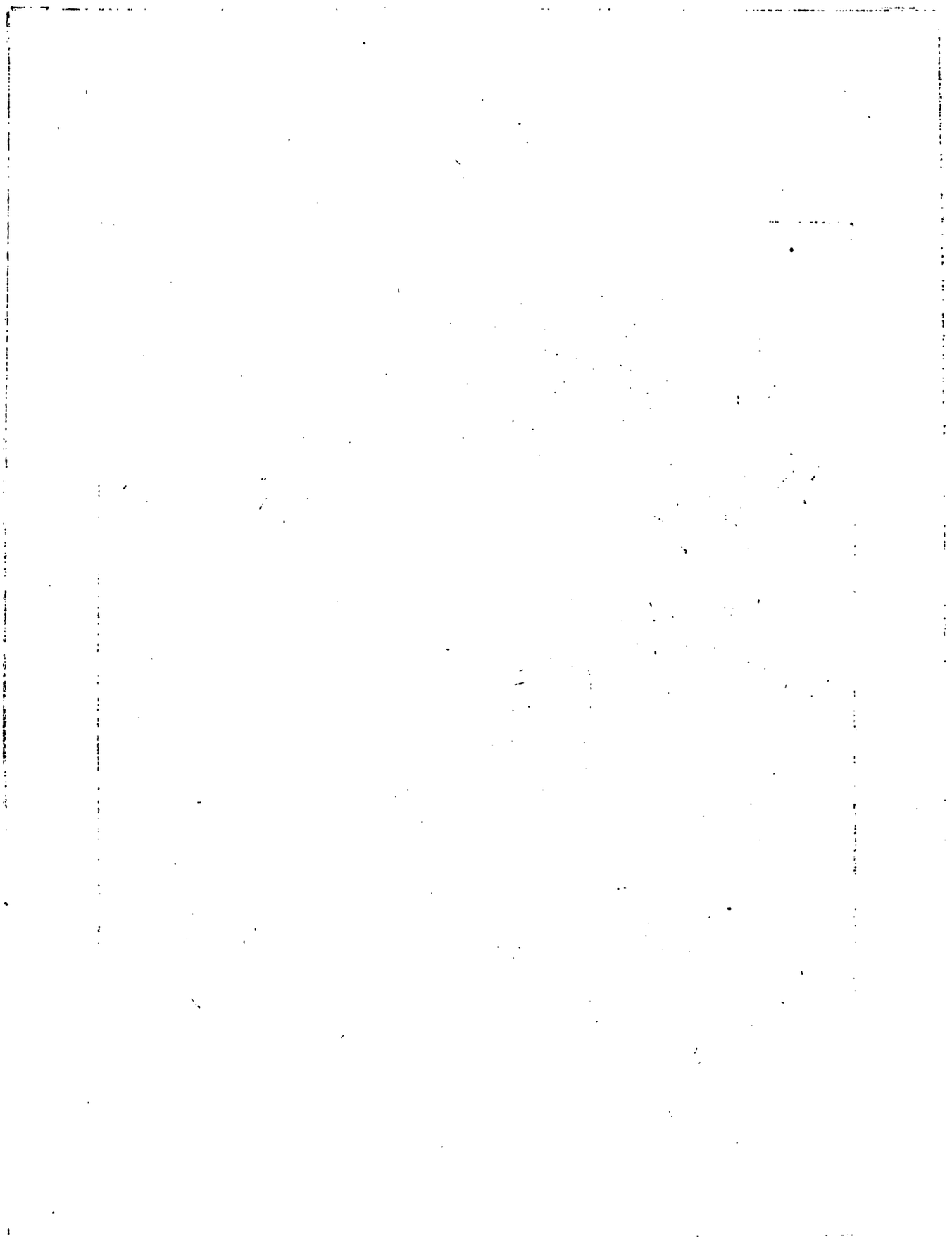
No. 5. One part of No. 1 solution, to be diluted with four to six parts of water, used for the finishing coatings of all objects.

What solutions should be chosen for every purpose must be left to the judgment of each operator. If any colour is to be given to objects, the paint ought to be ground up with water separately, and then mixed with the water-glass solution. In general, paint ought to be the third and fourth coatings, and more solution ought to follow until saturation is obtained. For glazing tiles and pottery, the following has been found to answer best, and be the most economical:—100 parts pure quartz, eighty parts of pure potash, ten parts of saltpetre, and ten parts of chunam powder, which when melted together, form a glass which melts at low heat. This mass is, after it is cold, to be reduced to powder. The articles to be glazed, generally called biscuits, must be dipped in No. 2 solution and powdered over with the last-mentioned powder, allowed to dry, and the powder will be found to adhere very firm; the articles have then to be fired in the usual way. The glazing thus produced will resist mineral and vegetable acids, and will also, in other respects, be found an excellent glazing. —*Calcutta Engineer's Journal.*



HERALDIC SHIELD.

PANEL (ITALIAN).



Statuary.

By Leon Baptista Alberti.

(*Continued and concluded from page* 15.)

BY the same rule the angles of the knees may be measured, of the shoulders, and of the other parts known as the *relievi*. But to find the concavities beneath the shoulders, in the regions of the reins, or in any of the parts which recede inward, and are removed out of sight, or are difficult of access, the best way is as follows:—

Add to the style another plummet line, reaching as far as the concavity to be measured. The distance of this plummet line from the first is immaterial, since by their both falling perpendicularly, and being intersected by the gnomon of the plane superficies above, to which they are fastened (which extends as far as the centre of the figure), it will be seen how much nearer the second plummet line is than the first to the centre of the definitor.

From these particulars it is sufficiently evident that this is an infallible rule for ascertaining the exact proportions of a living figure or a statue. But as everything is best illustrated by example, I have thought it necessary to take great pains in describing the proportions of all the principal parts of a man's body, supposing that body to be the very perfection of the human form. By means of this admeasurement the proportions of all the limbs to the whole body will be easily computed, also their symmetry, and how they vary from each other. The heights are taken from the ground; the breadths are measured from the right to the left, and though the thickness of some parts of the arms is given, I have mentioned only what is most common, since the size of the arm varies, of course, according to the play of the muscles when it is moved.

Heights from the Ground.

	Feet.	Deg.	Min.
To the instep	0	3	0
To the anklebone outside the leg	0	2	2
To the anklebone inside the leg	0	3	1
To the receding part under the calf	0	8	5
To the receding part under the *relievo* inside the kneebone	1	4	3
To the muscle outside the knee	1	7	0
To the buttocks	2	6	9
To the *os sacrum*	3	0	0
To the hip joints	3	1	1
To the navel	3	6	0
To the waist	3	7	9
To the bladebone of the stomach	4	3	5
To the neck where the windpipe begins	5	0	0
To the neck where the head is set on	5	1	0
To the chin	5	2	0
To the ear	5	5	0
To the hair on the forehead	5	9	0
To the middle finger of a hand hanging down	2	3	0
To the wrist of the same hand	3	0	0
To the elbow of the same hand	3	8	5
To the highest angle of the shoulder	5	1	8

Breadths.

Of the foot	0	4	2
Of the heel	0	2	3
Fullest part beneath the juttings out of the anklebones	0	2	4
Falling in above the ankles	0	1	5
Receding part of the middle of the leg beneath the muscle of the calf	0	2	5
Greatest thickness of the calf	0	3	5
Falling in under the *relievo* of the kneebone	0	3	5
Greatest breadth of the kneebone	0	4	0
Falling in of the thigh above the knee	0	3	5
Breadth of the biggest part of the thigh	0	5	5
Greatest breadth among the muscles of the thigh joint	1	1	1
Breadth of the largest part of the heart beneath the armpits	1	1	5
Breadth of the largest part between the shoulders	1	5	0
Breadth between the cheeks	0	4	8
Breadth of the arm at the wrist	0	2	3
Breadth of the brawny part of the arm under the elbow	0	3	2
Breadth of the brawny part of the arm above the elbow	0	4	0
Length from the big toe to the heel	1	0	0
Thickness from the instep to the corner of the heel	0	4	3
The falling in of the instep	0	3	0
From the falling in under the calf to the middle of the shin	0	3	6
The outside of the calf of the leg	0	4	0
The outside of the pan of the knee	0	4	0
The thickness of the biggest part of the thigh	0	6	0
From the navel to the reins	0	7	0
The thickness of the waist	0	6	6
From the bladebone of the stomach to the highest rising of the reins of the back	0	7	5
From the windpipe to the joining of the neck	0	4	0
From the forehead to the hind part of the head	0	6	4
The thickness of the shoulders	0	3	4

Decorations at Ironmongers' Hall.

The large room in Ironmongers' Hall, Fenchurch Street, which is 70 feet long, 30 feet wide, and 30 feet high, has been decorated recently by Messrs. Jackson, of Rathbone Place, in the Elizabethan manner, by means of *papier mâché*, colour, and gilding. The ceiling is coved and divided into panels by massive ornamented beams, something like the well-known ceiling at Audley End. The entrance-door has Ionic columns, the fireplace caryatides, and the opposite end of the room an ornate gallery, all made to look like oak. The total amount of the contract was £1563. The character is well-preserved throughout. We should be glad to see the London companies spend part of their surplus funds in the encouragement of art, by commissioning some of our artists to adorn their walls. Cannot the ironmongers (being men of metal) be induced to set an example? They would find it a good investment—perhaps a mainstay and support for the company in future times.

Grammar of Chymistry.

FOR THE USE OF ARTISTS AND ARTISANS.

CHAPTER VIII.—METALLIC BASES OF THE ALKALIES.

Potassium (symbol K, equivalent 39). It was stated in the preceding chapter that this metallic base of potash was discovered by Sir H. Davy in 1807. Hydrate of potassa, slightly moistened for the purpose of increasing its conducting power, was made to communicate with the opposite poles of a galvanic battery of 200 double plates, when the oxygen, both of the water and the potassa, passed over to the positive pole, while the hydrogen of the former and the potassium of the latter made their appearance at the negative pole. This process afforded potassium only in minute quantity, so Gay-Lussac and Thénard, discovering that potash is decomposed by iron at a white heat, contrived a process by which a more abundant supply of the metal is obtained. But the process for potassium now generally followed is the decomposition of potash by means of charcoal, first noticed by Curaudau, though an improvement in both processes has been made by Brunner, who decomposes potassa by means of iron and charcoal.

Potassium is solid at the usual temperature, but so soft as to yield like wax to the pressure of the fingers. At 70° it is semifluid, and at 150° perfectly fluid. When cooled to 32° it is brittle. At 60° it is considerably lighter than water, its density being then 0·865. When fresh, it has a white colour, with a shade of blue like steel; but when exposed to air, it is almost instantly covered by a dull film of oxide; for when thus exposed and not heated, it oxidates gradually without combustion; when heated, it begins to vaporise, takes fire, and burns with a violet flame. The avidity of this metal for oxygen is strikingly exhibited when a fragment of it is thrown upon water. It instantly decomposes the water, and so much heat is evolved as to kindle the potassium, which moves about upon the surface of the water, burning with a strong flame, of which the vivacity is increased by the combustion of the hydrogen gas disengaged at the same time. A globule of fused potash remains, which continues to swim about upon the surface of the water for a few seconds, but finally produces an explosive burst of steam, when its temperature falls to a certain point, illustrating the phenomenon of a drop of water on a hot metallic plate.

The compounds of potassium, which are very numerous, are as follows: *protoxide*, *peroxide*, *chloride*, *iodide*, *bromide*, *fluoride*, *hydurets* (liquid and solid), *carburet*, *sulphuret*, *bisulphuret*, *tersulphuret*, *quadrosulphuret*, *quintosulphuret*, *phosphurets* (composition and number uncertain), and *seleniurets* (also of uncertain number and composition).

Protoxide of potassium. This compound, commonly called *potash* or *potassa*, and by the Germans *kali* (an Arabic word), is always formed when potassium is put into water, or when it is exposed at common temperature to dry air or oxygen gas. Its value in the arts is dependent upon the state of its chymical action, which is solely exerted by that portion of alkali which is loosely combined, and can easily be set free to serve any purpose for which it may be required in manufactures. The value of potash is therefore proportional to the quantity of alkali contained in the corresponding acid. A complete chymical analysis would be the surest means of ascertaining the amount of potash, but the tediousness of the operation, the great practice required in manipulation, and the cost of apparatus, render any such method nearly impracticable to the manufacturer. An essential service has, therefore, been rendered by chymistry to the arts in pointing out a mode of ascertaining the amount of potash in the crude salt. But as to explain this would lead us into an unnecessary description of the principles of alkalimetry, we shall content ourselves with stating that potash is never obtained by a chymical decomposition of any other potash salt, or as a product ready formed in nature, but always from the ashes of plants. In commerce, the various kinds of potashes are classified, either according to the locality whence they are imported, or according to the route by which they arrive; thus we have American, Russian, Turkey, German, Moselle, Illyrian, Saxon, Bohemian, Dantzig, and Heidelberg potashes, which are seldom distinguished by their colour and appearance. The alkali used in the manufacture of glass, that is, bottle glass, is obtained, as far as the potash is concerned, from common ashes. Both kinds of glass are made with crude potashes and soda-ash, and the best with purified potashes and soda-ash.

Potash-ley. The solution of potash, or potash-ley, which has a slight but peculiar odour, dissolves the skin and other animal substances, is highly caustic, and has an intensely acrid taste. It neutralises the most powerful acids, restores the blue colour of reddened litmus, changes the blue infusion of cabbage into green, but in a short time destroys these vegetable colours. It acts upon fixed oils, and converts them into soaps. It also absorbs carbonic acid with great avidity from the air.

Peroxide of potassium is obtained when potassium burns in the open air or in oxygen gas. It is then converted into an orange-coloured substance.

Chloride of potassium is generated with evolution of hydrogen when potassium is heated in hydrochloric acid gas; and it is the residue after the decomposition of chlorate of potassa by heat.

Iodide of potassium is formed with evolution of heat and light, when potassium is heated in contact with iodine. The commercial iodide is frequently impure, and it is well to purchase it in crystals, which ought not to deliquesce in a moderately dry air.

Bromide of potassium is analogous to iodide in most of its properties.

Fluoride of potassium is best formed by nearly saturating hydrofluoric acid with carbonate of potassa, evaporating to dryness in platinum, and igniting, to expel any excess of acid.

Carburet of potassium is thought to form part of the residue in the preparation of potassium from the carbonate by charcoal.

Sulphurets of potassium. The *protosulphuret* is readily prepared by decomposing sulphate of potassa by charcoal or hydrogen gas at a red heat; *bisulphuret*, by exposing to the air a saturated solution in alcohol of hydrosulphate of sulphuret of potassium; *tersulphuret* by transmitting the vapour of bisulphuret of carbon over carbonate of potassa at a red heat as long as carbonic acid gases are disengaged; *quadrosulphuret*, by transmitting the vapour of bisulphuret of carbon over sulphate of potassa at a red heat, until carbonic acid gas ceases to be disengaged; and *quintosulphuret*, by fusing carbonate of potassa with its own weight of sulphur.

Phosphurets of potassium are formed when potassium is heated in phosphuretted hydrogen gas, and *seleniurets* when selenium is heated with carbonate of potassa.

(To be continued.)

Architectural Glossary.

(*Continued from page* 41.)

LEAVES. Ornaments imitated from natural leaves.

LINTEL. A horizontal piece of stone or timber over a door, window, or other opening.

LOOP. A small narrow window.

MARGIN OF A COURSE. That part of the upper side of a course of slates which appears uncovered by the next superior course.

MEDALLION. Any circular or oval tablet bearing on it objects represented in relief, as figures, heads, animals, flowers, &c.

MEMBER. A subordinate part of a building, as a frieze or cornice, sometimes a moulding.

METOPE. The square space in the frieze between the triglyphs of the Doric order.

MEZZANINE. A storey of small height introduced between two higher ones.

MODILLION. An ornament in the cornice of the Ionic, Corinthian, and Composite columns; a sort of bracket serving to support the projecture of the larmier or drip.

MONOTRIGLYPH. An intercolumniation in which only one triglyph and two metopæ are introduced.

MOULDINGS. The ornamental contours applied to the edges of the projecting or receding members of an order. The regular mouldings are the *fillet*, *listel* or *annulet*; the *astragal* or *bead*; the *torus*, the *scotia*, or *trochilus*; the *echinus*, *ovolo* or *quarter-round*; the *cyma reversa*, *inverted cyma* or *ogee*; the *cyma recta*, the *cavetto* or *hollow*.

MULLION. The vertical post or bar which in pointed architecture divides a window into several lights.

MUTULE. A projecting ornament of the Doric cornice, which occupies the place of the modillion in the other orders, and is supposed to represent the ends of rafters.

NAIL-HEADED MOULDING. Formed by a series of projections common in Norman buildings, resembling the heads of nails or square knobs. *Nebuly moulding* is an ornament in Norman architecture, the edge of which forms an undulating or wavy line, introduced in corbel tables and archivolts.

NECK (of a capital). The space, in the Doric order, between the astragal on the shaft and the annulet of the capital.

NEWEL. The upright cylinder or pillar round which, in a winding staircase, the steps turn, and are supported from the bottom to the top.

NOSING (applied to staircases). The projecting part of the tread-board which stands before the riser.

OCTASTYLE. A temple or building having eight columns in front.

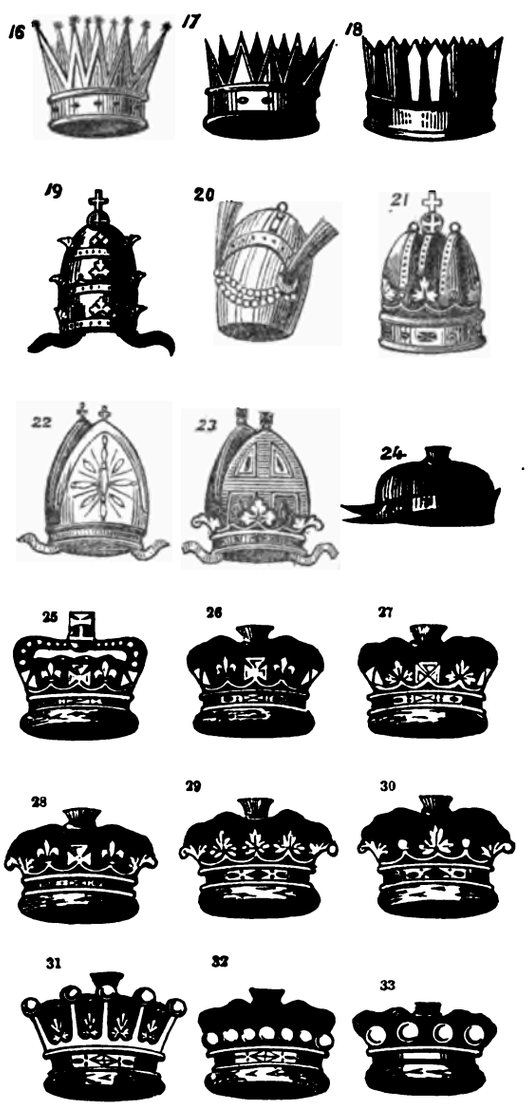
OFFSETS. The horizontal projections from the faces of the different parts of a wall where it increases or diminishes in thickness.

OGEE (same as *Cyma Reversa*). A moulding which takes its other name (Cyma) from the Greek κυμα, from its contour resembling that of a wave. When it is hollow in its upper part and swelling below, it is called *cyma recta*; when its upper part swells and the lower is hollow, *cyma reversa*. These names are given by the architects; it is the workmen who call these mouldings ogees. They are used much in the Doric, Ionic, and Corinthian orders.

(*To be continued.*)

Crowns and Coronets.

(*Continued from page* 43.)



16. Celestial; 17. Eastern; 18. Vallery; 19. Papal; 20. Turkish; 21. Roman (Catholic Bishop); 22. Bishop (Protestant); 23. Archbishop (Protestant); 24. Cap of Dignity; 25. Prince of Wales; 26. Younger sons or brothers; 27. Nephews of the blood royal; 28. Princess Royal; 29. Duke; 30. Marquis; 31. Earl; 32. Viscount; 33. Baron.

(*To be continued.*)

Technicologia.

191. *Purple Enamel.*—This colour is the oxide of gold, which may be prepared in different manners, as by precipitating, by means of a muriatic solution of tin, a nitra-muriatic solution of gold, much diluted in water. The least possible quantity of the solution of tin will be sufficient to form this precipitate. The solution of tin must be added gradually until you observe the purple colour beginning to appear; you must then stop, and having suffered the colour to deposit itself, put it into an earthen vessel and let it dry slowly. The different solutions of gold, in whatever manner precipitated, provided the gold is precipitated in the state of an oxide, always give a purple colour, which will be more beautiful in proportion to the purity of the oxide; but neither the copper nor silver with which gold is generally found alloyed injure this colour in a sensible manner; it is changed, however, by iron. The gold precipitate which gives the most beautiful purple, is certainly fulminating gold, which loses that property when mixed with fluxes. Purple is an abundant colour; it is capable of bearing a great deal of flux, and a small quantity communicates its colour to a great deal of matter. It appears that saline fluxes are better suited to it than those in which there are metallic calces. Those, therefore, which have been made with silex, chalk, and borax; or, white glass, borax, and a little white oxide of antimony, with a little nitre, as we have already mentioned, ought to be employed with it. Purple will bear from four to twenty parts of flux, and even more, according to the shade required. Painters in enamel generally employ for purple a flux, which they call brilliant white. This flux appears to be a semi-opaque enamel, which has been drawn into tubes, and afterwards blown into a ball with an enameller's lamp. These bulbs are afterwards broken in such a manner that the flux is found in small scales, which appear like the fragments of small hollow spheres. Enamel painters fix this flux with a little nitre and borax. This matter, which produces a very good effect, was employed without attempting to decompose it. It may be a very fusible common white enamel, which has been blown into that form. It is to be remarked, that purple will not bear a strong heat; and the colour is always more beautiful if the precipitate is ground with the flux before it has become dry.

192. *To Erase Crayon Marks.*—This is much more difficult than to erase those of the black lead pencil—Indian rubber smearing instead of cleaning. A piece of the crumb of bread is the best material to erase crayon marks; water will occasionally clean a paper thus marked, though rarely with certainty.

193. *Green Bronze Liquids.*—Take one quart of strong vinegar, half an ounce of mineral green, half an ounce of raw umber, half an ounce of sal ammoniac, half an ounce of gum arabic, two ounces of French berries, half an ounce of copperas, and about three ounces of green oats, if these can be procured, although if they cannot, the preparation will succeed perfectly well without them. Dissolve the whole in a strong earthen vessel, adding the berries and the oats, over a gentle fire; bring the compound to boil, then allow it to cool, and filter it through a flannel bag, when the bronze will be fit for use.

Interior Decoration.

Apart from those gorgeous displays of artistic talent in which the profuseness of ornament and the bold grandeur of design contest for superiority in the mind of the beholder, there is, undoubtedly, much yet to be effected, ere, as a nation, we may be said to have arrived at all near the acmé of art. It is not to the habitations of princes that we must proceed when about to form an estimate of national progress, nor must we either form our conclusions upon works that could never be effected but through the agency of almost boundless wealth, for in both cases we should be proceeding upon very chimerical data, on which very many have been led astray. The places to make our observations in, should be the homes of the *people*, that is, the middling and poorer classes of the community, for they, forming the bulk of the population, represent, in their own persons, the state of society.

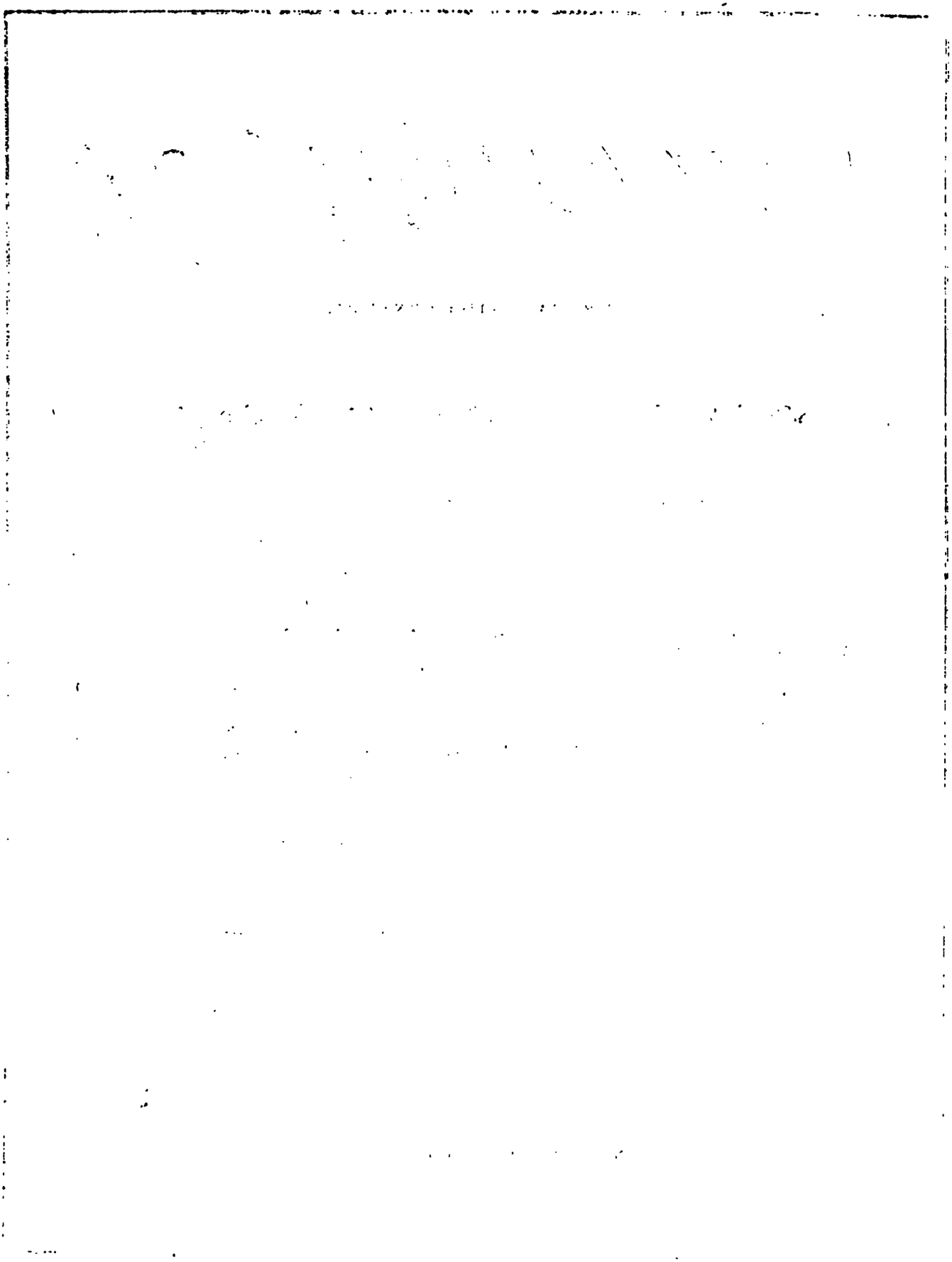
Interior decoration is rather a suggestive art than one whose principles can be brought within scientific rules; but this fact seems to be singularly lost sight of in England by those having the arrangement of inferior edifices, and the consequence is, the prevalence of a tasteless monotony, at once unnatural in theory, and in the highest degree offensive to true taste in practice. Where but in England, we ask, can be found, at the present time, such a little knowledge of the *effects* of ornament in different situations? In the continental countries and Eastern nations, we perceive this to be the primary consideration of the decorator, who, for that reason, so arranges his materials as to overcome natural defects and heighten natural beauties by the power of contrast. In England, however, the case is different—ornament is *stuck* upon walls because it is ornament, and for no other earthly reason. It matters but little to the *decorator* (?) whether the peculiar construction of the apartment will assist or destroy its beauties, and the consequence is, that, in nine cases out of ten, the result turns out an abortion.

On entering an English apartment, even in the middle of the dog days, you sometimes feel a most unaccountable chill—a peculiar sensation, that gives no idea of its cause, and you do not perhaps, discover it until, on looking round several times, you find that you are in an apartment having a northerly aspect, and *decorated* with stone-coloured ornaments. In the same way we often see a room facing the east bedizened and blazoned with gilding or yellow paint, which, reflecting the rays of the sun, produces a most insupportable heat.

These facts are well worthy of attention, inasmuch as the correction of the errors above set forth, will be the first great step in decorative advancement.

CONVERSION OF THE DIAMOND INTO COKE.

The diamond may be converted into a substance possessing the appearance, physical character, and electrical properties of coke, by attaching a piece of hard gas retort carbon to the positive wire of Bunsen's battery of 100 elements, then placing on it a small piece of diamond, and, after arming the negative wire with a cone of the same carbon, enveloping the diamond by dexterous manipulation, with electrical flame, whereupon the diamond will undergo a sort of ebullition, become disintegrated, softened, and be actual coke.



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NUMERALS—13TH CENTURY.

NUMERALS TO RIBAND ALPHABETS.—(SEE NOS. 33 AND 42.

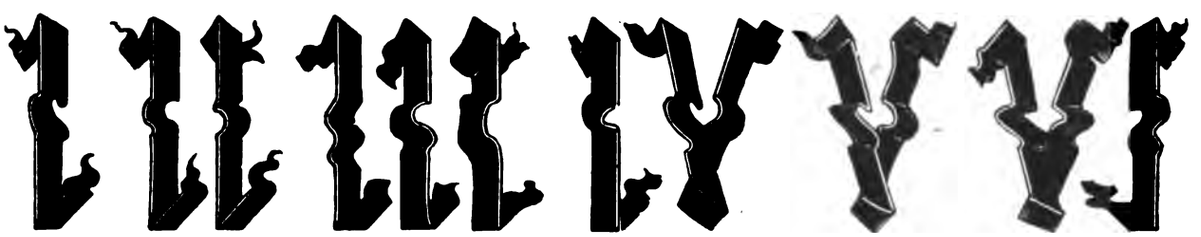
1 2 3 4 5 6 7 8 9

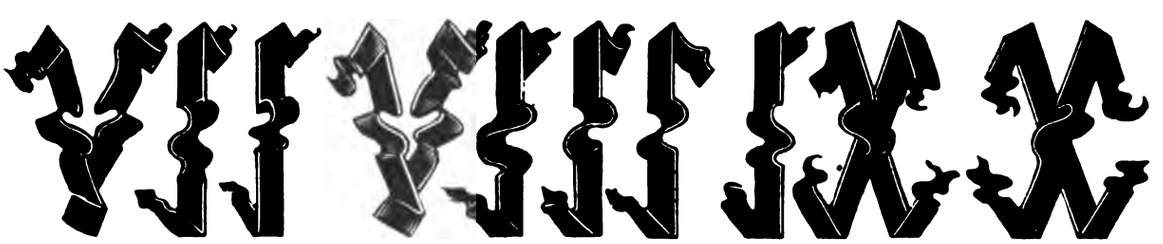
NUMERALS—15TH CENTURY.

CORINTHIAN CAPITAL.

1 2 3 4 5 6 7 8 9 0

NUMERALS—13TH CENTURY.





NUMERALS TO RIBAND ALPHABETS.—(SEE NOS. 33 AND 42.)

1 2 3 4 5 6 7 8 9

NUMERALS—15TH CENTURY.

CORINTHIAN CAPITAL.

Polychromy in Sculpture, or Colouring Statues.

By Professor Westmacott, R.A.

HAT are the objects proposed to be attained by painting or colouring sculpture?

1. Is it to render the imitation more close to nature?

2. Is it to attract attention?

3. Is it to gratify the sense by adventitious decoration?

4. Is it to give distinctness to the parts of a work when viewed from a distance? All these several questions deserve our attention.

First, with respect to close imitation.

It scarcely can be necessary to state to persons of any intelligence in art that it is a radical error to suppose that it is the province of the painter or sculptor to effect an exact imitation; that is, such imitation as shall produce illusion. All know that, in many respects, this is impossible in sculpture. In others, where it is possible, the *fac-simile* representation of inferior objects, such as veils, napkins, the stuffs and materials of drapery is, as all practical sculptors know, simply the work of a careful carver.

It may not be out of place to state the principle by which the sculptor is, or should be, governed in this respect. It has been stated that there are certain objects in nature which do not admit of being exactly imitated in sculpture. This is undeniable. But even if it were possible to carry the imitation of that which is the highest object of the artist's study—namely, the human figure—to such perfection as to induce the belief that it was real: that to any one entering a sculpture gallery, the figures should so closely resemble nature that, at first sight, they should appear to be living men and women standing on pedestals, would not the achievement cause a very disagreeable impression? Undoubtedly it would. At present the lover and admirer of art is gratified by the contemplation of a fine and successful work of art *as* a work of art. His imagination supplies all that is wanting; and he does not ask or expect that his senses shall be deceived. Nay, the moment he could bring himself to look at it as a positive and exact imitation of a human figure: the hair, the eyes, the lips, the nails—every part coloured and tinted, like life, but without life, he would be more disposed to shrink from than admire it. It is easy to imagine the feeling with which we should contemplate such well-known works as the Apollo, the group of Laocoön and his Sons, the Farnese Hercules, the Fighting or Dying Gladiator, and other admired statues so treated. Even such a near approximation to reality as is afforded by waxwork exhibitions, is anything but pleasing to the generality of people, and especially persons of taste in art, though they may be amused by the talent and ingenuity shown in thus producing resemblances. Even if they could be the productions of first-rate artists, the argument would equally apply. The dissatisfaction felt in this case, is to be accounted for on a perfectly intelligible principle. The reason for it is, that waxwork approaches *too near to nature* to be agreeable as *art*, and yet is not near enough, or true enough to nature—nor can it ever be so—to make us forget it is *art*.

Many sculptured works are to be found in this country from which a judgment may be formed of the effect of colour in increasing the truth of imitation, in the painted monumental figures still existing in many of our churches. They are chiefly of the sixteenth and seventeenth centuries, though the practice prevailed in the earliest period of such monuments. Probably, as they are of modern date, no value whatever will be allowed them; but had any figures or fragments resembling them been dug up in Greece or Asia Minor, there can be little doubt, judging from the examples that have been quoted, they would have been hailed by the polychromists as invaluable specimens of the practice, and triumphantly adduced as authority for its reintroduction. And how do these affect us, considered as works of art? Are not the best of them more suggestive of the toy-shop than the sculptor's *studio?*

Among our obligations to the committee of artists who have so carefully arranged the various courts at the Crystal Palace at Sydenham, must be noted, especially, the opportunity they have afforded the public of judging of the effect of the employment of colour in sculpture and architecture respectively. Upon its applicability to the latter art it is not necessary here to offer any remark. Polychromy in architecture has received full attention, and has been most ably discussed by many eminent writers. But where painting has been applied to insulated sculpture (for the frieze of the Parthenon must be so considered as it is here presented us), it surely is not asserting too much to say the bad effect it produces is quite enough to ensure its unqualified condemnation. The experiment here made of the light blue background only, with the relievo left in raw white upon them, is sufficiently unsatisfactory; but the grey, white, black, and brown horses, and their flesh-coloured riders, with their gilded heads of hair, all so admirable and so perfect in their simple art, are here degraded into tawdry toys. It is remarkable, also, that the figures appear now to have lost their symmetry, and the composition its unity, while all the finer qualities of detail in which they abound are entirely obscured. By far the most successful works of the kind are to be met with in Spain, where statues, as large as life, and represented in action, are to be seen painted with the utmost care and finish. It is known that while this taste prevailed, sculptors laboured to acquire also the skill of the best painters, that they might themselves execute this adventitious work, and thus ensure all the pictorial effect possible to their statues. As the artists of the time, the sixteenth century, were amongst the most able that Spain has produced—as Cano, Montanes, Hernandes—these performances far surpass anything of the kind found in other countries, and the effect they produce at first sight is described, by those who have seen them, as perfectly startling. But while giving them all due credit for the peculiar excellence they exhibit, several accomplished writers on Spanish art have not hesitated to record their unqualified condemnation of the practice, as opposed to all true principles of sculpture. But, to shew the extent to which enthusiasm and the determina-

tion to support any favourite theory may be carried, the ingenious author of a well-known treatise on polychromy says, "Si une figure colorée avec art et avec goût ne fait pas bien, c'est la sculpture qui est en défaut et non pas la polychromie." This is taking a somewhat unusual view of the position that sculpture might be supposed to hold in the question.

Sculpture coloured lost its distinctive or special character. It was a portion of an architectural effect. Colouring, we know, was extensively employed in architectural decoration, and when the sculptor was called upon to act in combination with the architect, his work, no doubt, was subject to the same laws of treatment as other parts of the composition. He placed his groups in the pediment, with its enriched coloured mouldings against a background, sometimes painted blue—perhaps to imitate the sky, but quite as likely merely to increase distinctness and relief to his figures. He further increased their effect, as portions of a general design, with gilding and other accessories, and, no doubt, also sometimes with colour. But, in all this, his object was to make his sculpture assist the whole effect. In short, it became necessary to adapt the sculptures, in colour and in finery, to the objects around them; so that, in fact, as we are now considering it, instead of a principal it became a subordinate and only ministerial accessory.

These are additional grounds for discountenancing the practice. It would prevent the multiplication of favourite works by casting, and further, would tend to a sensuous treatment of subjects calculated to be injurious.

Grammar of Chymistry.

FOR THE USE OF ARTISTS AND ARTISANS.

CHAPTER VIII.—METALLIC BASES OF THE ALKALIES.

Sodium (symbol Na, abbreviation of the German term *Natrium*, equivalent 23·31). Though first obtained by Sir Humphry Davy in 1808 by the electrolysis of caustic soda, sodium is now always obtained by the action of charcoal at high temperature. It is a white metal, having a colour intermediate between that of silver and lead, and so soft at the usual temperature (59°), that it may be cut with a knife, and yields to the pressure of the fingers. At 194° it is quite liquid. It oxidates spontaneously in the air, and with great vivacity when thrown upon water. If heated nearly to redness, it takes fire and burns with a yellow flame, and should a few drops of water be applied to it, it easily becomes sufficiently hot to take fire. It is the alkaline metal of the animal kingdom, and is more extensively diffused in the mineral world than potassium.

The various combinations of sodium resemble those of potassium so closely, that a detailed description of them would be superfluous. It may be sufficient to state that, when combined with two proportions of oxygen, it forms soda and peroxide of sodium.

Soda (NaO, 31·31), was an alkali known by the ancients in the state of carbonate, and called by them *nitre*. It is found native in great quantities in Egypt and in some other parts of Africa. But the great source of it is common salt, from which all the soda manufactured in Great Britain is made. From its great cheapness, a preference is given to soda for most manufacturing purposes. It has a grey colour, has a vitreous fracture, and requires a good red heat to fuse it. Its properties are so similar to those of potash, that a minute description is unnecessary.

A compound, known as *soluble glass*, is obtained by fusing together eight parts of carbonate of soda (or ten of carbonate of potash), with fifteen of fine sand and one of charcoal. The object of the charcoal is to facilitate the combination of the silica with the alkali, by destroying the carbonic acid, which it converts into carbonic oxide. This glass, when reduced to powder, is not attacked by cold water, but is dissolved by four or five parts of boiling water. The solution may be applied to objects of wood, and when dried by a gentle heat forms a varnish which imbibes a little moisture from the air, but is not decomposed by carbonic acid, nor otherwise alterable by exposure. Stuffs impregnated with the solution lose much of their combustibility, and wood is also defended by it, to a certain degree, from combustion.

The alkaline silicates are the bases of the ordinary varieties of glass. From the *silicate of soda and lime* window glass is formed; from the *silicates of potash and lime* the plate glass used for mirrors, crown glass, and the beautiful Bohemian glass; from the *silicates of potash and lead*, the purer and more brilliant species of glass in use in this country, such as that called crystal, of which most drinking vessels are made, flint glass for optical purposes, and strass, which is employed in imitations of the precious stones, and from the *silicates of alumina, of the oxides of iron, magnesia, and potash or soda*, green or bottle glass, of which wine bottles, carboys, and glass articles of low price consist.

A bottle of green glass may be devitrified, or converted into what is called Reaumur's porcelain, by enveloping it in sand, and placing it where its temperature is kept high for several weeks, as in a brick kiln or porcelain furnace.

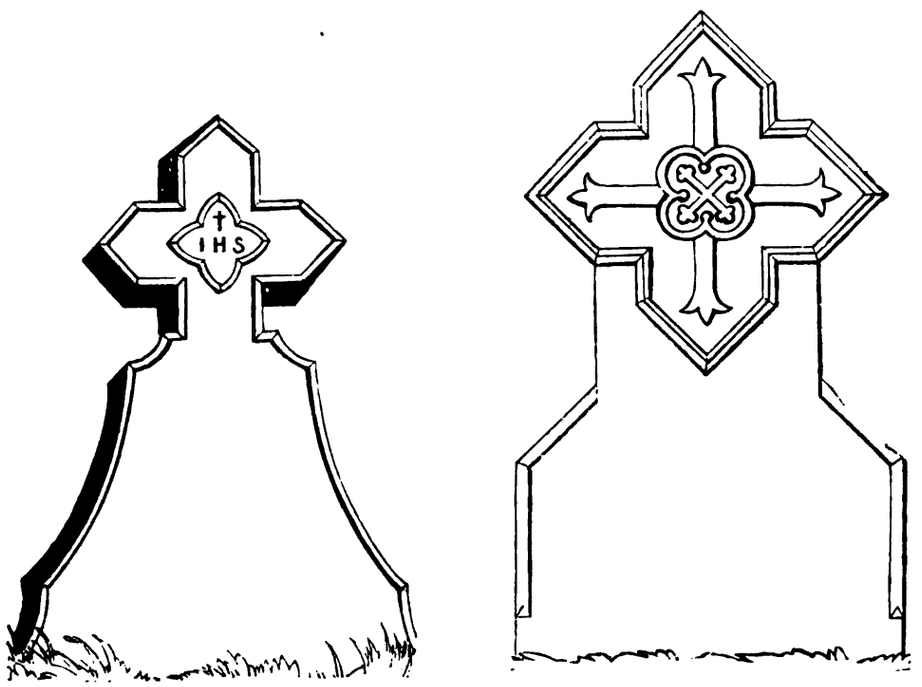
(To be continued.)

A NEW MINERAL USEFUL IN THE ARTS.

A few years ago Mr. Blake, of Akron, discovered a mineral in Ohio, in the United States, for which he has obtained a patent in Washington, as it promises to be of great value in the arts. When first dug up it is of the consistence of tallow, and gradually hardens in a few days so as to resemble slate, and finally it becomes as hard as rock. It is of the colour of indigo. It is impervious both to water and fire, and admits of the finest polish. When reduced to powder, and mixed up with linseed oil, it has the appearance of black paint, and may be spread over wood, canvas, &c. Roofs have been guarded by it against fire; and as it does not absorb the rain, it protects the rafters from decay. It consists of about one-half of silica, one-fourth of alumina, with less proportions of magnesia, black oxide of iron, sulphate of iron, lime and carbon.

MINERAL WEALTH OF THE DEMIDOFF FAMILY.

On this vast estate of the Demidoffs, containing 3,095,700 acres, nearly equalling Yorkshire, nature has been most bountiful. Iron and copper ore appear to be inexhaustible. Platinum and gold are in the upper valleys, and malachite is found there also in enormous quantities, with porphyry and jasper of great beauty, and various coloured marbles. Their forests extend over more than 10,000 square versts, and are thickly covered with timber.—*Atkinson's Oriental and Western Siberia.*



GOTHIC HEADSTONES.

Mouldings as Ornaments in Architecture.

By S. Smirke, Esq., R.A.

The simplest forms to which the term ornament can be properly applied, are mouldings; but, simple as they are, they are of more vital importance to architecture.

By a careful regard to their contour—by their breadth or minuteness—by their multiplicity or by the sparing use of them—by their boldness or their flatness, mouldings go far to mark and determine the character of a work. They are of highest value, by their unobtrusive yet clearly defined lines, in emphasizing any portion of a design. The history of our art may almost be said to be read in its mouldings. In its infancy the builders of the East knew hardly more than the bead, the hollow, and the fillet. It was reserved for the Greeks to refine upon these simple and rude elements. As in the highest efforts of sculpture, so in these subordinate Masonic details, a refinement was by them attained, which no succeeding age has ever reached, or been capable, I might truly say, of fully appreciating. Perhaps it would be difficult to point to a more striking evidence of the wonderful æsthetic cultivation of the Greek mind than the exquisite delicacy of their mouldings. Roman masons multiplied forms, but were indifferent to, perhaps wholly unacquainted with, the niceties of their far more fastidious teachers.

Then succeeded the metempsychosis of art; in its new birth architecture reverted to a few rude forms of mouldings; as it had been 1000 years before, so now the torus or bead, the hollow, and the fillet, with a few rude notches and splays, almost sufficed for the simple wants of earliest Mediæval art. As that art advanced, however, the chiaroscuro of its mouldings seems to have commanded great attention; but the very forcible effect that was so studiously sought was attained in the Early Pointed era, without any great multiplicity or variety of contours. The wonderful facility of execution attained by the masons of the following epoch led them rather to luxuriate in carving than in the simpler effects obtainable by mere plain mouldings. There was, however, far more refinement in their outlines than previously, such as the slight hollowing of the flat faces of their fillets, in order to produce more strongly pronounced lines and sharper arisses. The curve of double flexure, or ogee, was also at this period revived, and it added greatly to the variety and delicacy of shadows, although not to their force. As Mediæval architecture waned, its mouldings lost their vigour,—became thinner and poorer in effect. I feel, however, bound to admit my belief that this decadence is more observable in England than on the Continent. A comparison of the French with the English mouldings of the fifteenth century would, I fear, be very much to the disparagement of our own work. Besides varying the contour of mouldings, architecture soon found her account in calling in the aid

of the sister arts, in giving force and interest to mouldings; first they were painted, and then builders learnt to carve them.

I do not know that there are any examples remaining, in early Egyptian and Assyrian buildings, of carved or enriched mouldings; but it is very certain that they were abundantly painted. Both modes of enrichment were resorted to by the Greeks, but probably it was only in the more advanced state of the art that mouldings became habitually enriched. Nor was it till the period of Roman ascendancy that mouldings were carved with enrichments, otherwise than tenderly, and as it were timidly. A reference to the numerous examples of Greek mouldings contained in the British Museum will satisfy you that mouldings, remote even from the eye, were carved with slight emboss, and generally with very moderate under-cutting.

This forbearance, however, arose not from timidity, but rather from refinement, and from that ardent attention ever paid by Greek sculptors to breadth—a quality which, perhaps, more than any other, distinguishes true Greek art in all its phases.

No such fastidiousneness restrained the Roman carver. Extreme boldness and forcible expression characterise all their carved mouldings. A depth of under-cutting, and a vigorous chiaroscuro, which to earlier classical times were wholly unknown, became the distinguishing feature of Roman carved mouldings.

It is curious, but scarcely profitable, to mark the attempts at enriched mouldings during the ignorant ages that succeeded. As I have said, the history of our art may be read in its mouldings, and this truth strikes one with great force when examining the enrichments of that singular monument—the tomb of Theodoric. If all history were lost, we should still be able, in the mouldings of this powerful monarch's age, to infer the ravages of barbarian hordes, and the extinction of the civilising acts.

As time wore on, mouldings came gradually to be enriched with somewhat more intelligence, and better effect, although still very sparingly, at Ravenna in Lombardy, and subsequently on the banks of the Rhine, surviving examples shew that mouldings continued comparatively simple and moderately enriched. The string-courses were usually flat faces, retaining a strong savour of the classic type, and the jambs of openings were most commonly relieved rather by square rebates than by carved enrichments. At San Ambrogio, at Milan, much remains of this early age, and of all the arches forming the atrium of that basilica, that, only, has carvings on its jambs which forms the central, principal entrance.

It appears to have been chiefly in the north of France, and in England, where the masonic art distinguished itself with renovated force and vigour. There, rudely but boldly, the inventive talent of the carvers shewed itself in an infinite variety of ornament, with which they overlaid all their mouldings. This exuberance seems to have been checked and refined as art improved, and in the best Mediæval times emphasis was sought to be given to mouldings rather by forcible light and shadow than by excessive carving.

This comparative plainness of mouldings may, however, have been much promoted by the growing fashion of painting them, which culminated in those gorgeous displays of colour and gilding,—displays that shone out so resplendently in our own St. Stephen's Chapel, and previously at Assisi, and at the Ste. Chapelle, in Paris, where, although probably not one moulding was superficially carved, yet all were certainly stencilled and painted over in gold and colours.

On looking back upon the successive attempts to add ornament to architectural details, we shall perceive that, of enriched mouldings, those usually are the most successful which best retain their original motif or contour.

In this respect a marked difference exists between carved mouldings and most other kinds of carving. In the latter case one of the greatest faults that a carver can commit is to betray the form of the original block or log out of which his work is carved. If we can trace the outline of the parent stock, then a stiff, restrained, artificial character is sure to be impressed upon the object, which is destructive of freedom and grace, and of the higher qualities of the sculptor's art. On the contrary, when mere mouldings are carved, the eye is best pleased when the traces of their construction, as it were, remain unobliterated.

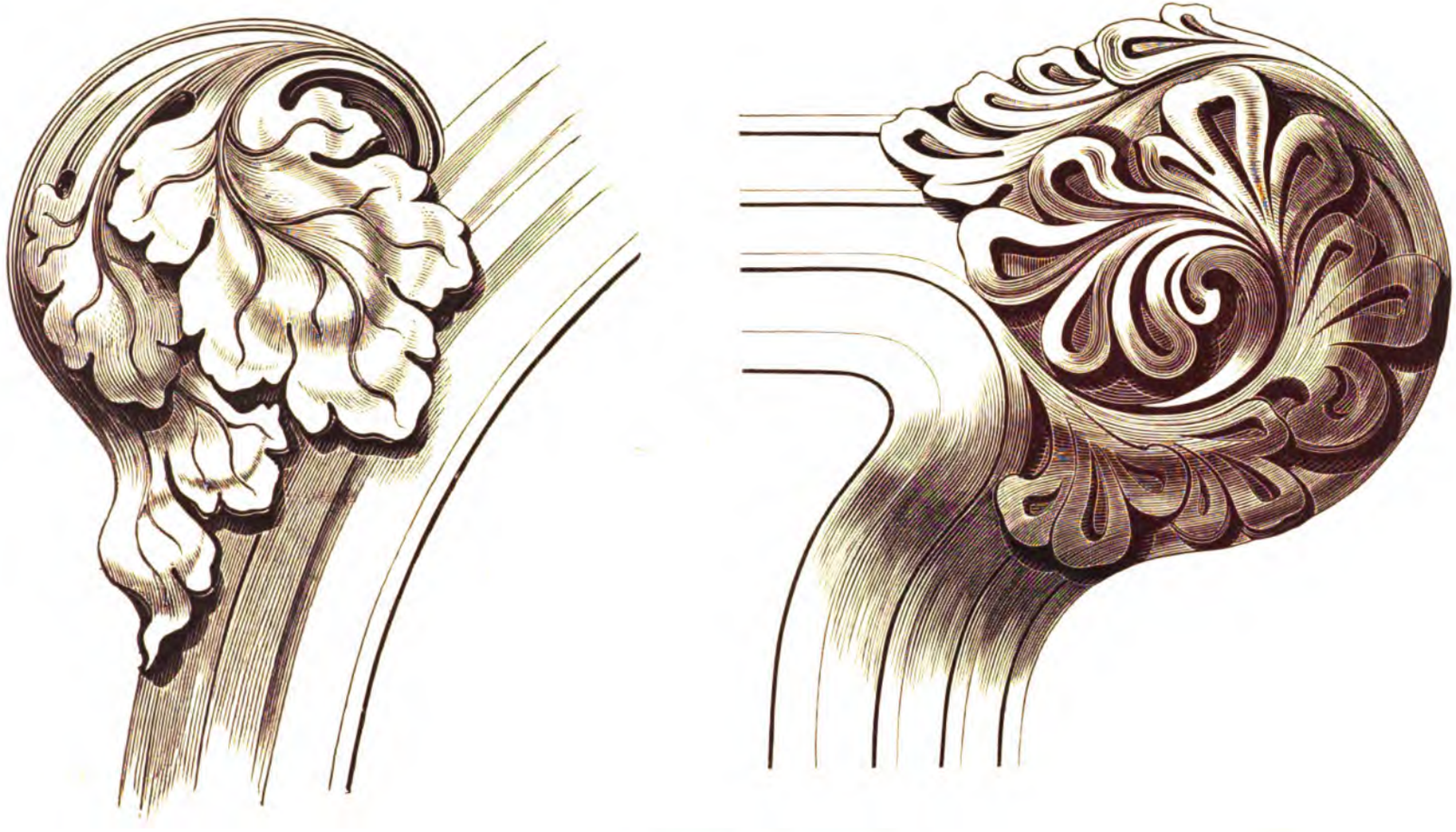
Technicologia.

194. *Gutta Percha a Fixture for Drawings, &c.*—M. Vogel states that gutta percha dissolved in sulphuret of carbon in all proportions, and without the aid of heat, when placed on the surface of any object, the carburet of sulphur evaporating with great rapidity, leaves a thin layer of gutta percha, which acts as a preservative against the influence of water and air. From this he is led to infer that the solution offers a great advantage for fixing in the paper, pencil, chalk, or charcoal drawings in such a manner that it is impossible to injure them by friction.

195. *To take Plaster Casts of Foliage.*—Mr. Deeble recommends the following process:—Lay the leaf, as soon as convenient after gathering, upon fine grained moist sand, in a perfectly natural position—having that surface uppermost which is to form the cast, banking it up with sand in order that it may be perfectly supported. Then by means of a broad camel hair brush, covered over with a thin coating of wax and Burgundy pitch rendered fluid by heat, carefully brush it over. The leaf must now be removed from the sand and dipped in cold water, when the wax becomes hard and sufficiently tough to allow of the leaf being ripped off without altering its form. This being done, the wax mould is to be placed on moist sand and banked up as the leaf itself was. It must then be covered with plaster of Paris, made thin, care being taken that the plaster is accurately forced into all the interstices by means of a camel hair brush. As soon as the plaster is set, the warmth thus produced will soften the wax, which, in consequence of the moisture, is prevented from adhering thereto; and with a little dexterity it may be rolled up and parted completely from the cast without sustaining the least injury. Casts thus obtained are very perfect, have a high relief, and are excellent models either for the draughtsman or the moulder of architectural ornaments.

SUPPLY OF GLYCERINE.

By a process termed "Reynolds' patent," glycerine, of which the supply is at present very inadequate, can be obtained at trifling cost from the refuse, or "spent lees," of their manufacture. Hitherto the supply has chiefly been derived from the sweet water of the candle makers. The commercial importance of the article is very considerable.



ARM RESTS (GOTHIC).

FROM THE FACADE OF SANTA MARIA DE' MIRACOLI, BRESCIA (RENAISSANCE).

The Formation of a Library.

By John Leighton, Esq.

THE library ought to be of good proportions, lofty, fire-proof, well-aired, lighted, and warmed, being furnished with due regard to the protection and preservation of its contents. The room best suited for this purpose is one on the first floor, or above a vaulted chamber, having but one external wall, with windows facing the north, imparting an even steady light without the glare of sunshine or heat, which perishes and fades the colours of bindings and other contents.

The library should be surrounded by shelves and, if lofty, by a gallery, for convenience of access, though on no account should the cases approach the ceilings, where in most rooms the air is hot and vitiated; as this tends to destroy, or rather impoverish, leather and other materials. The best and oldest plan of decoration above shelves is by busts, portraits of worthies, or trophies, agreeable to the eye and mind.

Mottoes and quotations, either upon cornices or entablatures, are pleasing incentives to study; as—

A · WISE · BOOK · IS · A · TRVE · FRIEND. ITS · AVTHOR · A · PVBLIC · BENEFACTOR.

BOOKS · TEACH · VS · TO · REFINE · OVR · PLEASVRES · WHEN · YOVNG · AND · TO · RECALL · THEM · WITH · SATISFACTION · WHEN · OLD.

BOOKS · ARE · THE · CHEAPEST · ENTERTAINMENT · AND · THE · MOST · LASTING · PLEASVRES.

BOOKS · ARE · KIND · FRIENDS. WE · BENEFIT · BY · THEIR · ADVICE · AND · THEY · EXACT · NO · CONFESSIONS.

L'VNIVERS · EST . GOVVERNE · PAR · LES · LIVRES.

ANIMI · PABVLVM. ANIMI · MEDICINA.

VN · VOMO · LETTERATO · NE · VAL · DVE
CHI · PIV · SA · E · PADRON · DEGLI · ALTRI.

The lower or floor shelves of the library, next the ground, should contain folios and other large works, and may project rather more than 18 inches into the apartment, affording a ledge, about the height of an ordinary sideboard, on which to rest with comfort such quarto and octavo volumes as are in use—the space above which, under the gallery, being appropriated to quartos and works of every-day use, which it is well to have within reach of the hand,* or at least from the dwarf steps (contrivances that should be light, strong, and easily moved about, having the wheels or castors under the step portion alone, to prevent accident). The upper or gallery shelves would hold octavos and smaller works, of less frequent reference than the lower cases, the gallery being sufficiently wide to permit two persons to pass, having a light ledge or over-hanging desk on which to rest the volumes, the floor being covered with felt, or some such substance, to deaden the sound in walking thereon.

In great public or private libraries most convenient and commodious cases may be erected, abutting into the apartment from the piers of windows, as they do not obstruct the light or air, and afford pleasant bays in which to study in quiet. At the Bodleian Library these compartments have gates, forming snug reading-rooms, from which the public are excluded. The library should be furnished with tables, covered with leather or cloth, having convenient drawers, also chairs—easy, without being luxurious—portable desks and reading-cushions for heavy books, with metal mountings or bindings, that should never be introduced into the shelves with other volumes, as they would, by their protuberances, be likely to injure them; they may be put in the drawers of library tables, with thick glass tops, and thus be seen, whilst the tables afford space on which to place things in general. To complete the furniture, a few presses with sliding trays (somewhat as a wardrobe) for folios of prints, an ample screen or two, and a light waggon for transporting volumes, will be useful.

In constructing bookcases it is always well to think of the growth of a library, its ever-increasing population that must have lodgment, the time when increased accommodation must be obtained. In bookcases it is perhaps not well to have them in divisions of more than four feet wide, or deeper than royal quarto, on the upper tier; as small compartments are more compact, fewer volumes being disturbed when in use. "The Delphin Classics" is, perhaps, as long a set of books as we may have to legislate for, and these would only occupy about five shelves: the rack-work at the sides, for elevation and depression, ought to be sunk within the cheeks—so as not to encroach upon the book-space to their injury in sliding in and out; nor should the cheeks be so made that a volume may become hidden behind the pilasters or heavy framing, as is sometimes the case, for then volumes get out of sight and out of mind. It is well to have shelves covered with leather, being rounded at the edge to prevent sharp scraping angles, and also strong enough to bear the weight imposed upon them. Strips of wood are sometimes inserted at the back of shelves, forming ledges to receive the volumes, making them range evenly. Blocks somewhat resembling thick volumes are useful for insertion, to prevent the books falling on the sides, as they are apt to do, when a few are subtracted. What, then, is wanted here, is some sort of wedge to press books up compactly together. There is always a difficulty in book shelves, namely, that the books fit them either too tightly, or too loosely; if tightly, the friction is great; if loosely, the volumes are apt to become soft, dust and bookworms finding freer entrance. The great difficulty of definitely stating the height of the shelves in all libraries, comes of the variety of sizes of printed books, from the ponderous folio of our forefathers, to the pocket diamond classic, that so persecuted the eyes of our fathers.

The covering of books, in the library, from dust, light, and intrusion, is somewhat difficult; for whilst that old-fashioned protector, chequered wire, kept out idle hands, it afforded no defence against bleaching, dirt or vermin; and, moreover, was unsightly, rendering the titles on the backs not easily read. The most economical method of partially defending books from dust, is by the affixing of

* Shelves can easily be constructed within reach of the hand, about seven feet from the floor; though in the British Museum and some other new libraries they are more than that. If the steps are to be used at all, then it is judicious to have the cases nine or ten feet high. If possible, the shelves in every part of the library ought to be of one width, that the books, when necessary, may be transposed *en masse*.

197. *Adulteration of Carmine.*—This valuable pigment is frequently adulterated with starch, which may be detected by placing a portion of the suspected mass in water of ammonia. If adulterated, the pure carmine dissolves, leaving the starchy matter, as well as most other sophisticating substances. Such debased carmine is apt to spoil with damp.

Grammar of Chymistry.

FOR THE USE OF ARTISTS AND ARTISANS.

CHAPTER VIII.—METALLIC BASES OF THE ALKALIES.

Lithium (symbol L, equivalent 6·41). It will be seen that the equivalent of this metal is much smaller than that of any other; its oxide has therefore a high saturating power. It is the metallic basis of a rare alkaline oxide discovered in 1818 by Arfwedson, named *lithia* (from λίθειος, stony), having been first derived from the earthy mineral *petalite* from the mine of Uto in Sweden, though it has been subsequently discovered in spodamine, lepidolite or lilalite (so called on account of the lilac or peach blossom colour of this argillaceous earth), and in several sorts of mica. Sir Humphry Davy first succeeded in obtaining by means of galvanism from this mineral the metal lithium, which is white-coloured like sodium, and highly oxidable.

Lithia, the only known oxide of lithium, in its alkalinity, in forming a hydrate with water, and in its chymical relations, is closely allied to potassa and soda; and is distinguished from them by its greater neutralizing power, and by its salts, also when fused on platinum, by attacking that metal and leaving a dull yellow trace round the spot where it lay. From baryta, strontia and lime it is distinguishable by forming soluble salts with sulphuric and oxalic acids, and from magnesia by its carbonate forming with water a solution which has an alkaline reaction.

Chloride of lithium, obtained by dissolving lithia or its carbonate in hydrochloric acid, yields by evaporation in a warm place colourless, anhydrous, cubic crystals, very deliquescent, dissolving freely in alcohol and water, and in the alcoholic solution burning with a red flame.

Fluoride of lithium, a fusible compound, prepared by dissolving lithia in hydrofluoric acid, possesses about the same solubility in water as the carbonate.

The other combinations, *iodide* and *bromide of lithium*, have not yet been examined.

Barium (symbol Ba, equivalent 68·66). This is another of the metals discovered by Sir Humphry Davy. It derives its name from βαρὺς (heavy), on account of the great density of its compounds. It is a dark grey coloured metal, with a lustre inferior to cast metal, is fusible under a red heat, is denser than oil of vitriol, oxidates quickly in water, and disengaging from hydrogen, is converted into barytes.

Barytes or *Baryta* when pure has a caustic taste, changes vegetable blues to greens, and is capable of forming a soap with oils. But this mineral and its salts may be considered at present useless in medicine or in the arts. Its action is, however, most powerful on the animal economy, as it is one of the most virulent poisons known.

The combinations of the metal are *peroxide, chloride, iodide, bromide, fluoride*, and *sulphuret of barium*.

Architectural Glossary.

(*Continued from page* 47.)

OGIVE. The arch of the Gothic vault. It passes diagonally from one arch to another, and forms a cross with the other arches. The point where the ogives cross each other is called the *key*, and is usually cut in the form of a rose, or *cul-de-lamp*. The mouldings of the ogives are called *nerves, branches* or *reins*; the arches which separate them *double arches*.

OPÆ. The beds of the beams of a floor or roof, between which are the *metopæ*.

ORB. A kind of foliage or flowers placed at the intersection of the ribs of a Gothic ceiling or vault, to conceal the mitres of the ribs.

ORDER. There are five orders of architecture, the proper understanding and application of which constitute the whole excellence of the art. Strictly, *order* is an assemblage of parts, consisting of a base, shaft, capital, architrave, frieze, and cornice, whose several services requiring some distinction in strength, have been contained in five several species, each of which has its ornaments, as well as its general fabric, proportioned to its strength. These five species are the *Tuscan, Doric, Ionic, Corinthian* and *Composite*. The *Tuscan* is devoid of all ornament. The *Doric* is enlivened with ornaments in frieze and cornice. The *Ionic* is ornamented with the volute scroll or spiral horn, with ornaments in a style of composition between the plainness of the Doric, and the richness of the Corinthian. The *Corinthian* has a capital adorned with two sorts of leaves, between which rise little stalks, forming the volutes that support the highest part of the capital. The *Composite* is nearly the same as the Corinthian, with the addition of the Ionic volute.

ORIEL WINDOW. A large bay or recessed window, ordinarily projecting from the outer face of the wall in a semi-octagonal or diagonal plan, and divided by mullions and transoms into different bays and compartments.

ORLE. A fillet under the ovolo of a capital.

OVOLO. A convex moulding whose lower extremity recedes from a perpendicular line drawn from the upper extremity. Its profile and sweep are usually the quadrant of a circle, hence its other name, *quarter-round*.

(*To be continued.*)

CORRESPONDENCE.—"Alpha" (Glasgow).—As you wish to be furnished with information for pursuing the study of the science and art of architecture in your leisure hours at home, and as you state that you are already a pretty fair draughtsman, you may begin by drawing a ground plan by scale, 4ft. or 8ft. by one inch. For instructions consult Richardson's Rural Architecture, published by Messrs. Orr & Co. at 1s.; the plans and arrangements are simple and good. With respect to construction, Weale's elementary works on the subject are both cheap and good; they vary in their prices from 1s. to 5s. each. You are, of course, aware that builders could not execute suitably the conceptions of architects, if the latter did not evince in their designs a perfect aquaintance with the relations of quantity and figure. Accordingly, they bring to the practice of their art all the aid that the abstract sciences can afford. You must, therefore, in the course of your studies, ground yourself thoroughly in the elements of arithmetic and analysis, algebra, geometry (practical and descriptive), plane trigonometry, conic sections, mensuration, mechanics and statics. You do not give us the least trouble by the questions you put to us. We shall be only too happy if the information we give should be of use to you. We may, possibly, shortly give a series of articles on construction.——"Subscriber."—It is our intention to insert occasionally designs for monuments suitable for cemeteries.

CONSOLES (ELIZABETHAN AND GREEK).

MURAL TABLET.

Natural Forms in Architectural Embellishment.

By S. Smirke, Esq., R.A.

WHETHER nature is to be literally and exactly copied, or whether the artist is to be permitted to conventionalise, that is, to depart from truth, in order to attain certain artistic effects, has been a fruitful subject of literary litigation: some idealists will claim the highest rank for those whose departure from nature is the widest, and who have adopted conventional forms for natural objects, until scarcely a trace of organic existence remains; whilst others uphold nature as their sole divinity, and would have us literally to repeat her exact forms as we see them expanding under the influence of the sun; and, if the leaves and blossoms look like real leaves and blossoms, they seem to regard the sculptor as having best fulfilled his mission. The question is too large a question to be gone into here: it is, I must say, one that has ever appeared to me to be by no means easy of solution.

There is, however, an argument against the doctrine of a strict reproduction of nature, which seems to me sufficient of itself to dispose of the question, so far as regards architectural ornament; namely, that such really and strictly exact reproduction is never practically possible, even supposing it to be desirable. The ability of the sculptor to represent foliage is in truth very limited. It is obviously quite beyond his power to represent the minuter subtleties of Nature; her downy, her pulpy, or her glossy surfaces; those filaments, and spiculæ, and silken cords, with which Nature dresses out her commonest productions, and without which she is most inadequately represented. These are all niceties, quite inaccessible to the carver's or the modeller's art; yet half the beauty of the vegetable world, exclusive of colour, lies in these attributes. It is clear, therefore, that, strictly speaking, some departure from exact resemblance, and, *pro tanto*, a conventional treatment of nature, is a practical necessity. I would venture to add, that were it even possible to realize in stone all these subtleties of shape and texture, it would be but an imperfect and impotent attempt. It would be but an imitation in form and not substance. The want of the transparency of nature, and above all the want of the colour of nature, would still leave the sculptor's art immeasurably behind her.

We must, then, be satisfied to follow at a respectful distance, and retire from the attempt to conceal the fact that we are working, not in vegetable tissues, but in marble, stone, or clay; and when we desire to represent the vegetable world, let us honestly adapt the beautiful shapes that Nature so lavishly spreads before us, to the gross materials we work in.

Such was the aim of the great artists of antiquity, and such was the aim, too, in Mediæval art, in what I believe to have been its best days. No doubt it must be broadly admitted that Classic artists conventionalised their foliage more boldly than those of latter times have done.

The Mediæval artist did not, it is true, hesitate to depart from natural types when the exigencies of his art called for it; but he certainly shewed a greater desire to imitate nature when he could; and this he often did with admirable effect.

The Greek appears, indeed, to have studiously avoided a naturalesque treatment of his subject; while the so-called Goth rather cultivated it. We can hardly find in the thirteenth century so wide a departure from any known natural production as the volute of an Ionic capital. On the other hand, in no work of high classic art can we find those trivial or grotesque sallies into which the naturalesque tendencies of the Middle Ages were apt to lead their sculptors; such as lively squirrels nibbling the nuts of a very conscientiously copied hazel tree, or a monk in his cowl, bagpiping amidst the foliage that adorns the capital or the corbel of some solemn sanctuary. The Greeks outraged nature, it is true, by introducing in their designs strange mythic beings, some monstrous compound of man, beast, bird, or vegetable (which, indeed, was warranted to some extent by the current mythology); but the builders of our ecclesiastical structures would often profane the temple of the true God by the capricious introduction of buffoonery and bêtises, for which no rational excuse can be found. It may be urged, perhaps, that these were but the *jeux d'esprit* of mechanical skill; but, speaking in the interest of architecture, it is certainly the clear duty of the architect to exclude from its decorative details all those ebullitions of fancy which are alike offensive to taste and at variance with the general tone and specific purpose of the building. Nor do we consult the dignity or support the unsullied character of our art in screening from blame, still more in imitating, that which is mean, or ludicrous, or not seldom worse. Let it be the aim and honour of the nineteenth century, when we are searching so diligently amidst the relics of past times, whether of heathendom or Christendom, to exercise a sound judgment in rejecting every ignoble or vicious habit or attribute of antiquity, seeking out and selecting that which is pure, and wholesome, and of good report, as alone worthy to be the object of our study.

Grammar of Chymistry.

FOR THE USE OF ARTISTS AND ARTISANS.

CHAPTER VIII.—METALLIC BASES OF THE ALKALIES.

Calcium (symbol Ca, equivalent 20.)—Calcium is the basis of lime, and the name applied to it is derived from the mineral termed calx. It has the colour and lustre of silver, and was one of the discoveries of Sir Humphry Davy, made by means of the voltaic battery. Doubtless, it would unite with other metals, though its physical properties have been as yet imperfectly studied. Exposed to atmospheric air it instantly absorbs oxygen, and burns with an intense white light, again returning to the state of lime.

The protoxide of calcium, *lime* (symbol CaO, equi-

valent 28), was known and employed from the remotest ages. It occurs always in combination with an acid, the carbonic, the sulphuric, the phosphoric, the fluoric, the arsenic, and the silicic. When combined (which is very common) with carbonic acid, it constitutes *limestone, marble, calcareous spar,* and *chalk*; when with sulphuric acid, *gypsum* and *selenite*, and when with fluoric acid, *Derbyshire spar*. These three combinations are respectively termed by chymists *carbonate of lime, sulphate of lime*, and *fluate of lime*.

From these observations it will be seen that lime does not exist pure in nature, and this is on account of its great affinity for water and carbonic acid.

Carbonate of lime forms one of the most abundant and important substances in nature, whole mountains and vast tracts of country consist of immense strata of it in various states of purity, deposited at different epochs in the existence of the earth. If we confine ourselves only within the limits of these isles, we shall, on referring to Griffith's Geological Map, find that it constitutes the romantic rocks which border many of the most beautiful valleys of the south-west of Scotland, abounds in northern and central England, encircles the wide primary regions of Wales, and is the prevalent and characteristic rock in most of the Irish counties, except Derry, Antrim, and Wicklow. Of all the strata yet discovered, it gives most completely the notion of a chymical precipitate. Hutton, in his system of geology, believes it to be of mechanical design, produced by an intermixture of decomposition brought about by the waste from oolitic districts being deposited by streams in lakes, or by shells and other marine exuviæ being drifted by the currents of the ocean, and lodged in coral reefs. The thorough absence of proofs of mechanical action, the regularity and continuity of its beds, and the extreme perfection of its organic contents, are convincing that the earliest condition which can be assigned to it is that of extrication by chymical and vital processes from some solution of lime in water. Geologists now-a-days view it as an organic deposit, resulting from a decomposition of sea-water, aided, in many instances, to a wonderful extent by the vital products of zoophytic, echinodermatous, and molluscous animals.

Sulphate of lime is rapidly formed by art, and exists abundantly in nature, known, as already stated, by the name of gypsum or plaster of Paris. By calcination it loses water, and the reabsorption, or addition of that liquid, enables it to form a useful and cheap cement, or to take casts of gems and metals. Lime mixed with silica, alumina, and oxide of iron also forms plastic cements for marble or stone, and mortars. An excellent hydraulic mortar is obtained from concretionary masses found in marl, or in isolated rocks in the bed of the Thames.

Phosphate of lime forms to the extent of 86 per cent. a constituent of the bones of animals.

The other salts of lime are numerous and important.

Lime is a white pulverulent earth, not fusible, except by the heat of the voltaic pile, or of the oxyhydrogen blow-pipe. With water it presents this singular phenomenon. If that fluid be sprinkled on fresh caustic lime, a heat is produced, estimated by Dalton at 300° Fahr.; and Pelletier states that on such an occasion heat is evolved so as to be seen in a dark place. The water entirely disappears, and a solid *hydrate of lime* is formed.

Uncombined lime, or (as it is termed in the arts) *quicklime*, is obtained by exposing pure pellucid Iceland crystal, or the whitest Carrara marble, to a white heat in a covered crucible.

Lime is applied to a variety of useful purposes in ordinary life and in the arts. Agriculturists use it as a manure for land; also tanners and skinners in the preparation of their leather; soapboilers for dissolving the oil, and facilitating its union with the alkaline salt; likewise sugar refiners for refining their sugar. Medical men administer *lime water* internally in spasms, diarrhœa, and the convulsions of children, and apply it externally to burns and ulcers. The *nitrate*, when fused, forms phosphorus. The combination of chlorine with lime is one of great importance, from its extensive application in the process of bleaching. The *chloride*, formed into an aqueous solution, forms a disinfecting fluid, and is a convenient mode for removing dangerous and disagreeable miasmata in fever hospitals, or the chambers of the sick.

(To be continued.)

Architectural Glossary.

(Continued from page 56.)

PAMPRE. An ornament composed of vine leaves and branches of grapes, wherewith the hollow of the circumvolutions of twisted columns are sometimes decorated.

PANCARPI. Garlands and festoons of fruits, flowers, and leaves for the ornament of altars, doors, vestibules, &c.

PANNIER. (*Same as* CORBEL.) A range of stones projecting from a wall for the purpose of supporting a parapet, or the superior projecting part of the wall.

PANTILE. A gutter tile.

PARVIS. A porch, portico, or large entrance to a church.

PEDESTAL. The lowest division in an order of columns, called also *stylobates* and *stereobates*. It consists of three principal parts—the base, the die, and the cornice.

PEDIMENT. An ornament, generally of a triangular form, but sometimes circular, that finishes the fronts of buildings, and serves as a decoration over gates, windows, niches, &c. In Gothic architecture this triangular piece is much higher in proportion to its width, and is termed a *gable*.

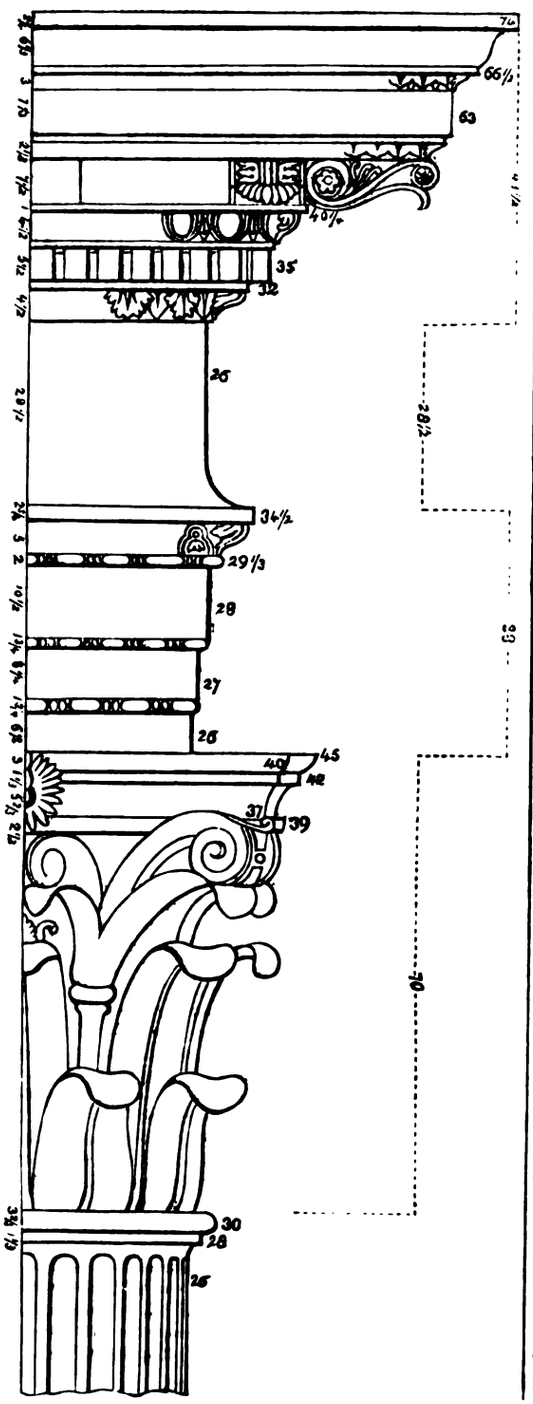
PENDENT. An ornament suspended from the summit of Gothic vaulting, very often elaborately decorated. The pendent was also used very frequently in timber-framed roofs, as in that of Crosby Hall, which has a series of pendents along the centre of it.

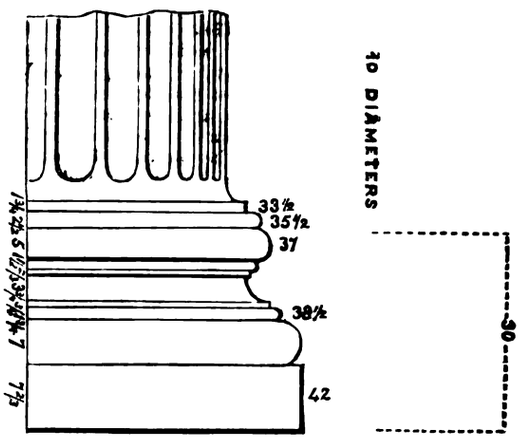
PENDENTIVE. The entire body of a vault suspended out of the perpendicular of the walls, and leaning against the arch boutants, or supporters.

(To be continued.)

CORRESPONDENCE.—"J. C." (a constant subscriber).—It is necessary, before answering your question, to inform you that *grammes* is the unit of weights in the new system of French legal standard weights, and is equal to a cubic centimètre, that is 19 grains French equal (in English measure) to 15·438 grains troy; and that *kilogrammes* (as its name implies) contains 1000 *grammes*, so that a kilogramme is equal to 2·6803 lbs. troy, or 2·2055 lbs. avoirdupois. It therefore follows that (without taking the decimals into calculation) 32 grammes are equal to 32½ pennyweights of gold, and 5 kilogrammes to 10 lbs. of water.

The Five Orders.





CORINTHIAN COLUMN (PALLADIO).

Technicologia.

198. *Lamp-black.*—Lamp-black is prepared principally by the combustion of refuse and residuary rosin left by the distillation of turpentine. It is burnt in a furnace, so constructed that the dense smoke arising from it may pass into chambers hung with old sacking, where the soot is deposited, and, from time to time, swept off, and sold without any further preparation. When lamp-black has been heated red-hot, it may be regarded as a very pure form of charcoal, for it burns entirely away, and leaves no residuary ash; when, however, the products of its combustion are closely examined, traces of water are always found, and, therefore, probably a small quantity of hydrogen is chymically combined with charcoal. A substance analogous to lamp-black, may be formed by passing the vapour of turpentine, alcohol, or several of the oils, through tubes heated to a bright red heat; at that high temperature, they are more or less perfectly decomposed, and a quantity of impalpable charcoal collects in the tubes, in which, however, as in lamp-black, traces of hydrogen may be detected. Lamp-black has been principally used in the manufacture of printers' ink; but Messrs. Martin & Grafton have taken out a patent for making this black from common coal tar by a very ingenious process.—*Professor Holmes.*

199. *Meglyph.*—To each pint of cold-drawn linseed oil, purified by exposure to sunlight for a few months, add one ounce of powdered sugar of lead; place the jar in a sand-bath, and boil over a clear fire, stirring until the sugar of lead is dissolved. Two parts of this boiled oil to three of mastic varnish produces meglyph that works well and does not separate, although it will not dry quite so rapidly as some that is prepared by the colour makers, yet quite sufficiently so for the safety of any work. It is a great improvement to put it into collapsible tubes as soon as made.

200. *To Destroy the Elasticity of Indian Rubber.*—The elasticity of Indian rubber is destroyed by cutting it into long slips, passing it through cold water, and then

winding up tightly on reels, in which state it must be left for about three weeks. This is the method employed by the manufacturers of Indian rubber fabrics.

201. *To Clean Marble, Jasper, Porphyry, &c.*—Mix up a quantity of the strongest soap-lees with quicklime, to the consistence of milk, and lay it on the stone, &c., for twenty-four hours, clean it afterwards, and it will appear as new.—This may be improved by rubbing or polishing it afterwards with fine putty powder and olive oil.

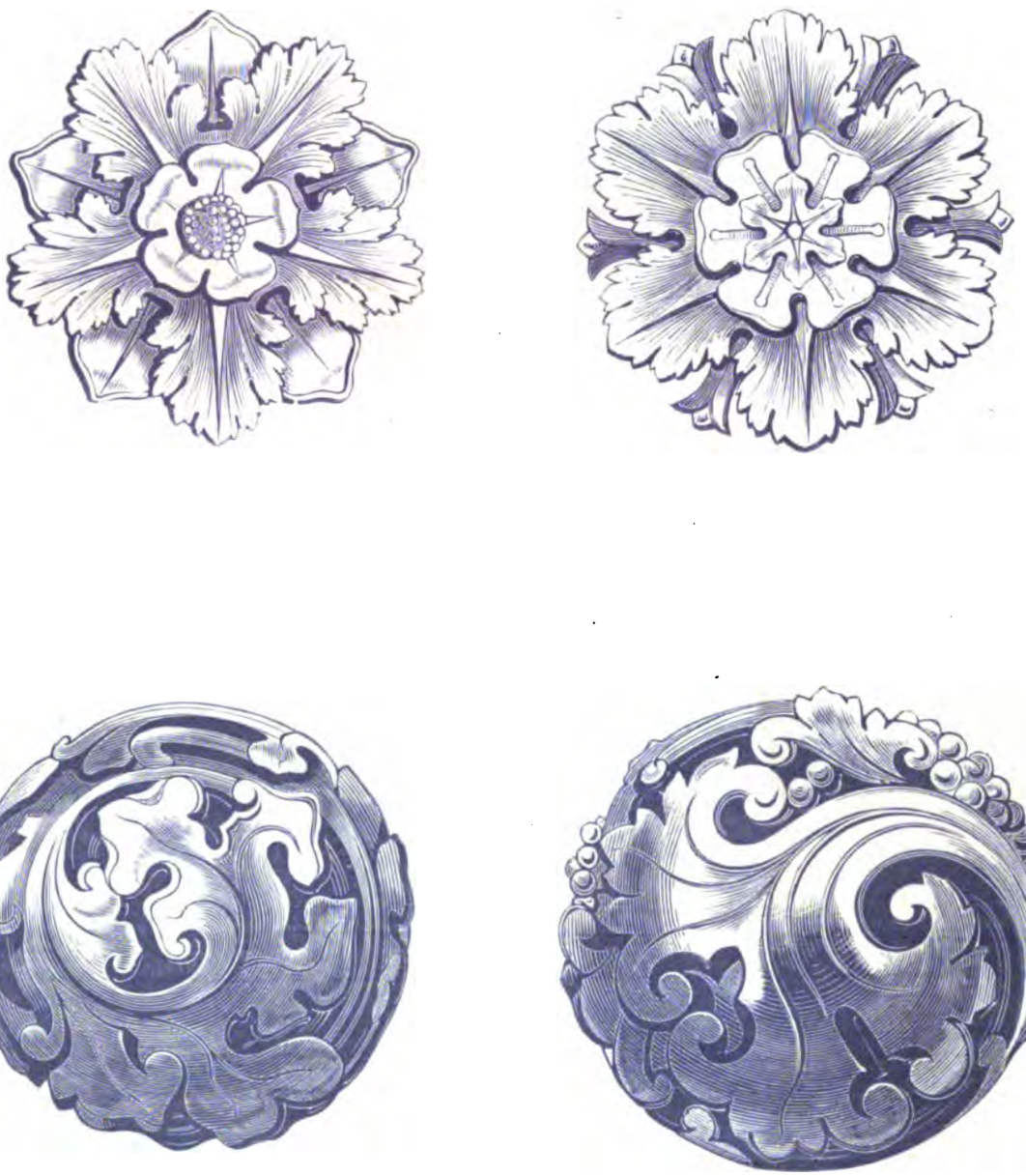
The Proper Decoration and Furnishing of Gothic Dwelling Houses.

If Gothic architecture is to be our national style, it will shew itself in the inside as well as on the outside of our houses. In the middle ages there was no article of furniture which did not bear the impress upon it. It becomes, therefore, a contradiction that a house whose constructional portion is Gothic should be discovered to be fitted up in a manner totally opposite to the spirit of that style. We ought to consider in what way we can give expression to the interior arrangement of our houses, so as to be consistent with the exterior. At the outset we are impeded by several difficulties, which, there is little doubt, are the great hindrances to a proper style of furniture. The false notions which people have with respect to the style;—an idea that Gothic and comfort are opposed—that Gothic or Pointed is fitted only for churches and church furniture—that, in some way or other, it expresses particular religious sentiments—and that the purchase of furniture is in no way connected with architectural taste, but merely a matter between the upholsterer and purchaser, are among the difficulties in our way. On the side of the upholsterer are old prejudices to traditionary patterns, which are sometimes modified and brought out as "new styles," the readiness of getting men to work at old patterns for low wages, and the tolerably fixed prices. There are besides, on the purchaser's side, the prevailing evil of desiring to make show for a little, and the niggard price given for good work; and on the seller's part an incapacity, from education or ability, to design what is suitable. The great principle on which to go is reality. To be real, we must be practical and honest. On the one hand absurdity is avoided, on the other sham. To be practical, we must consider our wants as persons living in the nineteenth century — we must regard comfort and utility in our designs as well as harmony and beauty.

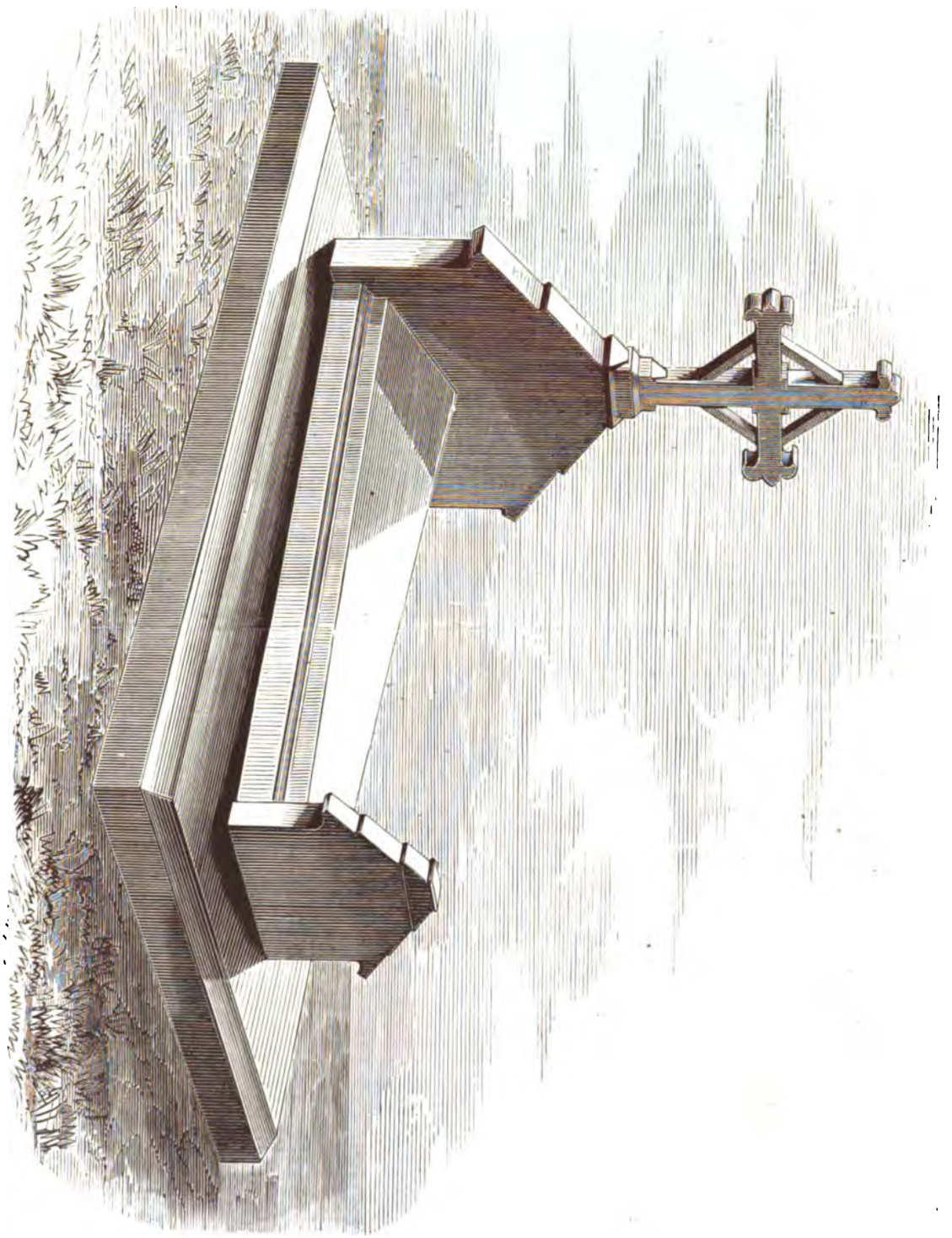
The subject of house decoration generally is a very wide one, and cannot be more than touched on. A few subjects may be handled—as the arrangement of colours in papers, carpets, curtains, chair and sofa coverings, ceiling decorations, and the use of coloured materials for ornamentation, as marbles, coloured tiles, woods, &c. The chief objections to Gothic furniture are—first, incompatibility with comfort; second, its inconvenience for being moved about; and, thirdly, the very great increase of expense in its manufacture. Gothic, from its very nature, is easily modelled to any form, so as to ensure comfort and retain its own character. It is not necessarily clumsy and heavy, and if the principle of shewing construction were adopted, its capability of being moved about would be much greater than the present style of furniture, as it would take to pieces. If it were in common use, so far from costing more, it would cost less than common furniture, from its being able to relinquish the more costly woods and make the best of common ones. Oak, beech, deal, pine, birch, &c., are the various kinds of woods that should be used, and varnish instead of paint adopted, so as to bring out the natural grain of the wood. A great evil in the present system is the employment of sham, and the most universal instance of sham is veneer. Now, veneer is only lawful in inlaid woodwork, which is its proper sphere, and may be employed with great advantage, and admits of great beauty in that way. While there is the necessity of Gothic architects paying more attention to the comfort and convenience of their plans, it is incumbent on us all to resort to the use of common sense as the golden rule which would prevent us from attempting exactly to assimilate our houses to those of the middle ages, or from rejecting their models entirely.

INVENTION OF STEAM NAVIGATION.

A writer in the *American Historical Register* shews, that so far from Fulton being the first who applied the steam-engine to navigation, he was in fact the twelfth. Eleven different boats had before that time been propelled by American inventors, and it was from the experiments of these men and of English mechanics that Fulton achieved success. The eleven experiments preceding that of Fulton were as follows:—1. A small skiff moved seven miles an hour by steam, 1786, by John Fitch, assisted by Henry Voight. 2. A boat, 45ft. by 12ft., built by John Fitch, tried at Philadelphia in August, 1787. 3. One built by James Rumsey, of Virginia, and tried in December, 1787, but only made one short trip at the rate of four miles an hour. 4. One built by John Fitch, 60ft. long by 8ft., tried in July, 1788, and made a trip of twenty miles in three hours and ten minutes from Philadelphia. 5. Another by Fitch, in 1789, which conveyed passengers from Philadelphia to Burlington at the rate of eight miles an hour. 6. One built by Samuel Moray, of Connecticut, which made a trip from Hartford to New York at the rate of five miles an hour. 7. A yawl moved by a screw propeller at the stern, and tried upon "The Collect," by John Fitch, in 1796. 8. One built by Samuel Moray, built with paddle wheels, and tried upon the Delaware in 1798. 9. A screw built by Oliver Evans at Philadelphia, 1804. 10. By John Cox Stephens, of New York, which went from Hoboken to New York in 1804. The eleventh steamboat was constructed by John Cox Stevens at New York in May, 1804, which went to New York and returned, being propelled by a wheel at the stern. There were steamboat experiments also known to have been made before 1800, by Nicholas I. Rooseveldt, under the patronage of Robert R. Livingston, at New York, but a detailed account of them has not been preserved. After the propulsion of these eleven vessels by steam in the United States, came Fulton with the twelfth in 1807, twenty-one years after Fitch's first experiments; and Fulton, instead of being the inventor of steamboats, was only the successful adapter of the discoveries and ideas of others.



BOSSES (GREEK AND GOTHIC).



TOMBSTONE (GOTHIC).

Furniture and Furnishing.

UPON entering a room, anyone in the habit of thinking upon repose, order, or design, can see at a glance whether fastidious taste has presided over selection, or a mere reliance on the recommendation of the upholsterer or commission-agent.

Possibly one of the most important features in the proper adornment of the interior of our houses, and one certainly the least considered, is the curves of the various articles of furniture, and of matters of decoration generally. The correct arrangement of outline gives the peculiar character to all the finest furniture. It has been urged, that "the composition of curves will be most agreeable when the mechanical means of describing them shall be least apparent;" and we know that at the best period of art, the curves used in mouldings and ornaments were those of the higher order, such as conic sections, whilst in the period of declining art, circles and compass work prevailed. In the choice, therefore, of your cabriole chairs, tables, and pier-glasses, look to their curves, and to the relation they bear to the other furniture of the room, and to the room itself. This necessity equally applies to all the minor articles where undulatory lines are in use; and, as the laws of beauty are much more arbitrary than is generally supposed, an investigation into the causes which make one article beautiful and another the reverse, is a very useful and a very agreeable recreation. You object to the bulge in that jug because it is too sudden, or you delight in the outline of that vase, or you greatly prefer the oval frame of that particular picture to the other square ones, probably not remembering that your taste has been guided by the most subtle and delicate laws of geometry, plane, and solid. Arabesque designs owe their beauty to the highest principles of this science, shewing the close relationship between art and science—so close, indeed, that in some cases it is almost difficult to say where the one begins and the other ends; and so wonderfully formed is the human mind, that it arrives at results and produces wondrous effects before the causes and principles which have led to them are discovered.

The next important matter for consideration is *arrangement*, so that one piece of furniture may not unduly obtrude on the observation of the beholder to the detriment of his neighbour, nor its colours kill adjacent articles. The eye loves the contemplation of harmony, and none can exist in a chamber, however magnificently furnished, unless proportion is observed. How often the entire beauty of an otherwise well-furnished room is utterly ruined by a gaudy carpet, the ill-assorted colours in which dissipate the vision, and do not permit the eye a moment's rest on worthier objects. Repose is so necessary for the visual faculties that they enjoy nothing without it, and as the eye naturally first seeks the floor, it is best fitted for the enjoyment of surrounding objects of beauty if it does not rest on a pattern which might suggest the idea of an iris distorted into madness by the agonies of the loom! The same remarks apply, of course, to the papering of the room. There, again, patterns of all kinds are destructive to decorative furniture, although when there are neither pictures on the walls, nor ornamental objects around, paper of delicate and appropriate design is an excellent substitute—and comparatively a cheap one—for more expensive means of pleasing the eye and satisfying the taste; but do not indulge in both, for each will be neutralized by the other. In short, a room furnished with incongruous objects, without regard to harmony and arrangement, however admirable they may singly be, is like a room full of people talking at once, making of the whole more jargon and din, even though each individual speaker may be an impersonation of wisdom itself.

Grammar of Chymistry.

FOR THE USE OF ARTISTS AND ARTISANS.

CHAPTER VIII.—METALLIC BASES OF THE ALKALIES.

Magnesium (symbol Mg, equivalent 12·2). The discovery of this metal was made by Sir Humphry Davy during his elaborate series of researches on the earths and alkalies in general. This metal has a brilliant lustre and a white colour like silver, is very malleable, fuses at a red heat, undergoes no change in a dry air, and though oxidising superficially in a moist air, may be boiled in water without oxidation. Heated to redness in air or oxygen gas it burns with brilliancy, yielding magnesia, and it inflames spontaneously in chlorine gas.

The only known oxide of magnesium is *magnesia* (MgO; 20·2), which exists naturally as a constituent part of several minerals and rocks, and seems to communicate to all the steatite family their present soapy feel. It forms a part of the saline ingredients of sea water, and its sulphate forms the chief active principle of many of the natural springs, so much the resort of invalids. It is a white light powder, soft to the touch, without smell, and possessing only a rather bitter taste. It slightly changes the vegetable blues to green. The *carbonate of magnesia* of commerce is generally contaminated with some sulphate of lime. Sulphate of magnesia was originally procured by evaporating the mineral spring which rises at Epsom: hence it acquired the name of *Epsom salt*. In Italy it is manufactured from schistose minerals containing sulphur and magnesia. It exists in considerable quantity in sea-water; and uncrystallised residuum in the salt-pan after all the common salt is crystallised, consists partly of this salt dissolved in water. This residuum is usually called bittern, and sometimes in Scotland *spirit of salt*, though that term is applied in England to hydrochloric acid. Magnesia is largely employed in medicine: the sulphate is a cooling purgative, and the carbonate, or the pure earth, is used as a purgative and antiacid.

The oxides of the seven metals described in this chapter constitute the most powerful alkaline bodies. They all combine readily with acids, and form *salts*. The chlorides, bromides, and iodides of these bodies are also salts. The order of the affinity of these bodies for acids is as follows:—Barytes, strontian, potash, soda, lime, lithia, and magnesia. But to this order there are some exceptions. For example, lime unites to oxalic acid in preference to the other bases, when they are all in solution together.

Is Ornament best taken from Nature?

By the Rev. J. L. Petit.

It is, unless I am mistaken, frequently asserted, and without much fear of contradiction, that no ornament can be good or pleasing, unless it is taken, more or less, directly from nature. Now, this is an assertion the truth of which I am not disposed altogether to take for granted. I am ready to admit, that while we take nature as a guide, we are not likely to go very far wrong in ornamental design; but I am not prepared to say, either that the beauty of fine forms consists in their recognition of natural objects, or that nature leads us up to the attainment of the finest forms, unless it be by a somewhat circuitous route. I am inclined to think that a thing is natural because it is beautiful, rather than that it is beautiful because it is natural.

Mr. Ruskin, in his first volume of the "Stones of Venice," has shewn the coincidence between certain architectural lines, and curves, exhibited by natural objects; as the outline of a mountain, or the form of a leaf, or bough of a tree. We cannot fail to be struck with the beauty and value of the remarks to which I allude; yet, I think, we can hardly found upon them a positive restriction, in architectural design, to such forms as are habitually presented by nature, or evidently suggested by her. If the architect is able to discover a beautiful form, I cannot suppose he is debarred from using it, before he has found that it has been sanctioned by a counterpart in nature. It may possibly exist, unknown to him; but it is not the less beautiful or pleasing, even though it should never be exhibited by some natural object. I question very much whether nature ever does present to us the most perfect types of form, or whether she invariably leads us up to them, except, as I said, by a very circuitous road. I argue from analogy.

There are a great many geometrical lines extremely beautiful in shape, and curious in their properties. How few of these does nature actually present to the eye? She gives us a straight line in the horizon at sea and in a sunbeam; a circle and circular arc in the sun, the moon, and the rainbow; an ellipse in the moon when not at the full. If we again present to her the circle under certain conditions, she gives us the other conic sections and the epicycloid. If we furnish her with a perfectly flexible and uniform chain, she gives us the catenary. Perhaps the law of growth in some shells may produce strictly geometrical spirals.

I am not aware that any more can be added to the list of the mathematical lines which nature definitely and provably exhibits to the eye. She does not set before us the cissoïd and conchoïd, curves of the highest beauty, and whose names are derived from natural productions. She does not present us with the cycloid, a curve of the most graceful form, and abounding in most extraordinary geometrical and mechanical properties. If there is such a thing as a maximum line of beauty, it probably has never been presented in its integrity, either by geometry or nature. But this does not prevent us from endeavouring to discover it, and feeling that we are approaching to it. I began my paper by remarking that perfection in art never had been, and was never likely to be reached, but that the very essence of refinement consisted in our constant efforts to attain to it.

Again, nature rarely, I may say never, sets before us a perfect type of her own productions. Whoever would find the characteristics of such a type, must adopt the method of Zeuxis, and study many specimens. We are never left in doubt what to look for, but we are never permitted to find it in a single specimen, without some blemish or defect. From the above considerations I am led to conclude that we are justified in trying to discover other forms of beauty besides those which are habitually exhibited to us by nature; that the discovery and right application of such forms is a proof of high artistic genius, and that those styles are not necessarily the most refined that draw the most exclusively from well-known natural objects their systems of ornament.

Glass Staining and Glass Gilding.

"Camden Street, Birmingham.

"Sir,—I will thank you to communicate through your valuable 'Decorator' the *modus operandi* of producing a pale amber stain on glass, such as we see on door knobs, finger plates, &c.; and also what is the best and simplest flux for vitreous gilding on glass.

"I am, Sir,

"Yours obediently,

"G. V."

"*To the Editor of the 'Universal Decorator.'*"

Staining glass a pale amber is kept, we believe, a profound secret in the manufactories where it is prepared. A beautifully delicate, yet costly yellow, however, is produced by *oxide of uranium*; but if this oxide contain traces of iron, the yellow will have a greenish hue. Another yellow can be produced by *silver*. The method is peculiar. A mixture of powdered clay and chloride of silver (horn silver) is prepared (not mixed with the glass in the pot, but applied to the surface of the ready-made article). On re-heating the article in a muffle, the silver penetrates to a certain depth into the glass before the latter softens, and even before the coating is firmly attached to it. It can, therefore, be scratched off when cold, and the yellow colour then appears in its full purity and brilliancy. This yellow can only be successfully brought out with glass that contains alumina. Another very superior yellow colour is produced (much cheaper) by *antimony*. The antimony is generally in the state of glass of antimony (*vitrum antimonii*), which is obtained by wasting sulphuret of antimony to the state of antimonious acid, and melting it with from 3 to 5 per cent. of undecomposed sulphuret of antimony. The antimonious acid is converted by fusion with sulphuret of antimony, with the evolution of sulphurous acid, into a transparent hyacinthine mixture of oxide and sulphuret of iron, and glass of antimony. Antimonite of potash (*antimonium diaphoreticum*) answers the same purpose. Yellow can also be obtained by *oxide of titanium*, and by *oxide of antimony* any tint of yellow can be produced.

With respect to your second question:—The proper flux for gilding on glass is *anhydrous borax*. Vessels *may* be gilt by fixing gold leaf upon them with *copal varnish*, but *real* gilding is effected by the aid of heat.

For this purpose a solution of gold in aqua regia (chloride of gold) is precipitated by potash or green vitriol, when a very finely divided brown powder, consisting of metallic gold, is obtained; this is washed and dried, and rubbed up with the flux (anhydrous borax). The mixture is then easily applied with a brush, having been previously mixed with oil of turpentine or gum-water. When the dried pieces are now heated in the muffle, the volatile oil escapes, the gum is consumed, and the borax melts, and firmly attaches the gold dust to the surface of the vessel. Take notice of this: the gold is dull, yellowish brown, and without lustre, when first removed from the fire, but acquires lustre and its peculiar colour by the friction of a burnisher made of agate or bloodstone.

Architectural Refinement.

A refined style means one that not only bears the impress of past improvement, but one which is continually receiving fresh improvements, and which presents no obstacles, in the shape of radical and inherent defects, to an unlimited amount of improvement. A low phase of art may easily be advanced to a point beyond which it is impossible to proceed. In high art the impossibility consists, not in any irremediable defect or insurmountable obstacle, but in the limited measure of power and genius on the part of him who approaches it. And a higher style of art may abound with faults, but they are not irremediable; and the skill and perseverance of the artist should be called into exercise to the uttermost to discover and apply the remedy. No true artist, whatever be his branch of art, will rest content without doing something towards its improvement, either in developing beauties or correcting faults: he will not think all is done which is required of him when he has learned to work according to certain received rules and precedents: he must try if he cannot refine upon them by studying, and, if possible, carrying out still further the principles which guided the great masters on whose authority they were laid down. Nor is he to spare the faults even of these. The works of men of the highest genius are often the fullest of faults. You will probably find enough and to spare in the productions of Michelangelo and Sir Christopher Wren. They had something else to do besides finding out the faults of the style they had chosen; they saw its capabilities and were intent on bringing out its excellences, leaving to minds of a different cast the task of criticism and correction. Look at the manner in which they handled the style; the vigour and expression given it by the one, the grace and beauty attained by the other. Their works, doubtless, have many faults; real faults, not mere violations of conventional rules; yet their authors were among the greatest refiners of the style they adopted.

SUBSTITUTE FOR COAL.

Two substances, called Cialine and Lignitine, are produced by a chymical process from ordinary peat and lignite, or brown coal. They were originally prepared by a chymist of Cologne, and can replace coal and coke at a saving of 35 to 50 per cent. in price. Numerous experiments have been made with these two products on German railways, and in factories, with very good effect and satisfactory result.

Crowns and Coronets.

(*Continued from page* 47.)

The Romans had various crowns, which they distributed as rewards of military achievements.

Fig. 34. Oval crown—was composed of myrtle, and was bestowed only on generals who had the honour of a triumph.

Fig. 35. Olive crown—awarded to those who had signalized themselves by feats of gymnasium in the different arenas.

Fig. 36. Oak crown—was made from the branch of a green oak, and was awarded to the soldier who had saved the life of a Roman citizen in an engagement, and was considered the most honourable. Persons on whom this merit was conferred, when they attended any public show, the senate and the whole of the attendants would rise on their entrance to signify their respect, and they were allowed to take their seat among the senators.

Fig. 37. Triumphal crown—made of the laurel, and was presented by foreign states and provinces to generals who had gained great victories.

Fig. 38. Crown of valour—being a circlet of gold, raised with palisades and jewels, and was awarded to those who first forced the enemies' entrenchment.

Fig. 39. Naval crown—bestowed on those who had distinguished themselves at sea; this was set round with figures in the form of beaks of ships.

Fig. 40. Mural crown—awarded to those who first scaled the walls of a city in a general assault. It was formed in the shape of battlements and brick-work.

The Application of Terra Cotta to Architectural Purposes.

Terra cottas, by some called plastics, belong to that class of the fictile art which includes all figures and ornaments of clay, formed either by the hand or by moulds. The difficulties in the application of terra cotta to architectural purposes are mechanical and economic rather than artistic. It is difficult to preserve the harmony of the proportions and exactness of the forms in the process of firing; and if none but the finest clays were used, the cost would be little inferior to that of marble. The Messrs. Vizebent have only a thin crust of the finest clay on the surface of their productions—the interior being composed of coarser and cheaper materials. Now, the difficulty which they have to overcome is, to keep exact harmony between the shrinking of the crust and of the inside during the process of firing, or desiccation, so as to prevent the separation of the layers or the fracture of the surface. In all the specimens which we have seen this had been successfully accomplished; but we found reason to believe that the producers failed much more frequently than they were willing to acknowledge.

A greater defect in terra cottas is their incapacity to resist the continued action of the atmosphere. Some of our readers have probably seen the copy of the monument of Lysicles, commonly called the lanthorn of Diogenes, erected in the park of St. Cloud. This, the largest plastic production of modern times, was executed by the Brother Tribucci, after the designs of Molinos. The body of the material appeared to us as close-grained and well-burned as any of the ancient specimens of terra cotta; but though it was placed in its present position only in 1808, it is already crumbling into decay. We differ, very reluctantly, from Brongniart; but we are convinced that terra cottas will not bear exposure, and that their use should, therefore, be confined to internal decorations.

Architectural Glossary.

(*Continued from page* 56.)

PENDENTIVE BRACKETING. That springing from the rectangular walls of a room up to the ceiling, and forming the horizontal part of the ceiling into a circle or ellipsis.

PERRON. A staircase outside a building.

PIER. A solid between the doors or windows of a building; the post or other mass to which a gate is hung; and the solid support from which a bridge springs. An *abutment* pier is the pier in a bridge next the shore.

PILASTER. A square column, insulated or engaged in a wall.

PILLAR. A column of irregular form, deviating from the proportions of the orders, unrestricted by rules, and arbitrary in its parts.

PINNACLE. The ornament in Gothic architecture placed on the top of a buttress, or the termination to the angle of a gable. It is usually of a slender form, tapering to a point.

PLAFOND. Any sofite or ceiling.

PLANCEER has the same meaning.

PLATBAND. Any flat and square moulding, the projection of which is less than its height.

PLINTH. The lower square member of a base of a pedestal. In a wall, the rows of bricks which project from the face.

POINTED ARCHITECTURE. The style of architecture in which all the arches are pointed at the top, which arches are termed *pointed arches.*

POINTING. Raking out old mortar from brickwork, and substituting new mortar.

POLYSTYLE. An edifice of many columns.

POMEL. A globular protuberance terminating a pinnacle.

PORCH. A covered approach to a principal doorway.

PORTAL. The lesser gate, when there are two of different dimensions at one entrance. It also means the arch over a door, and the framework of a gate.

PRESBYTERY. The choir and other eastern parts of a church reserved for the officiating priests.

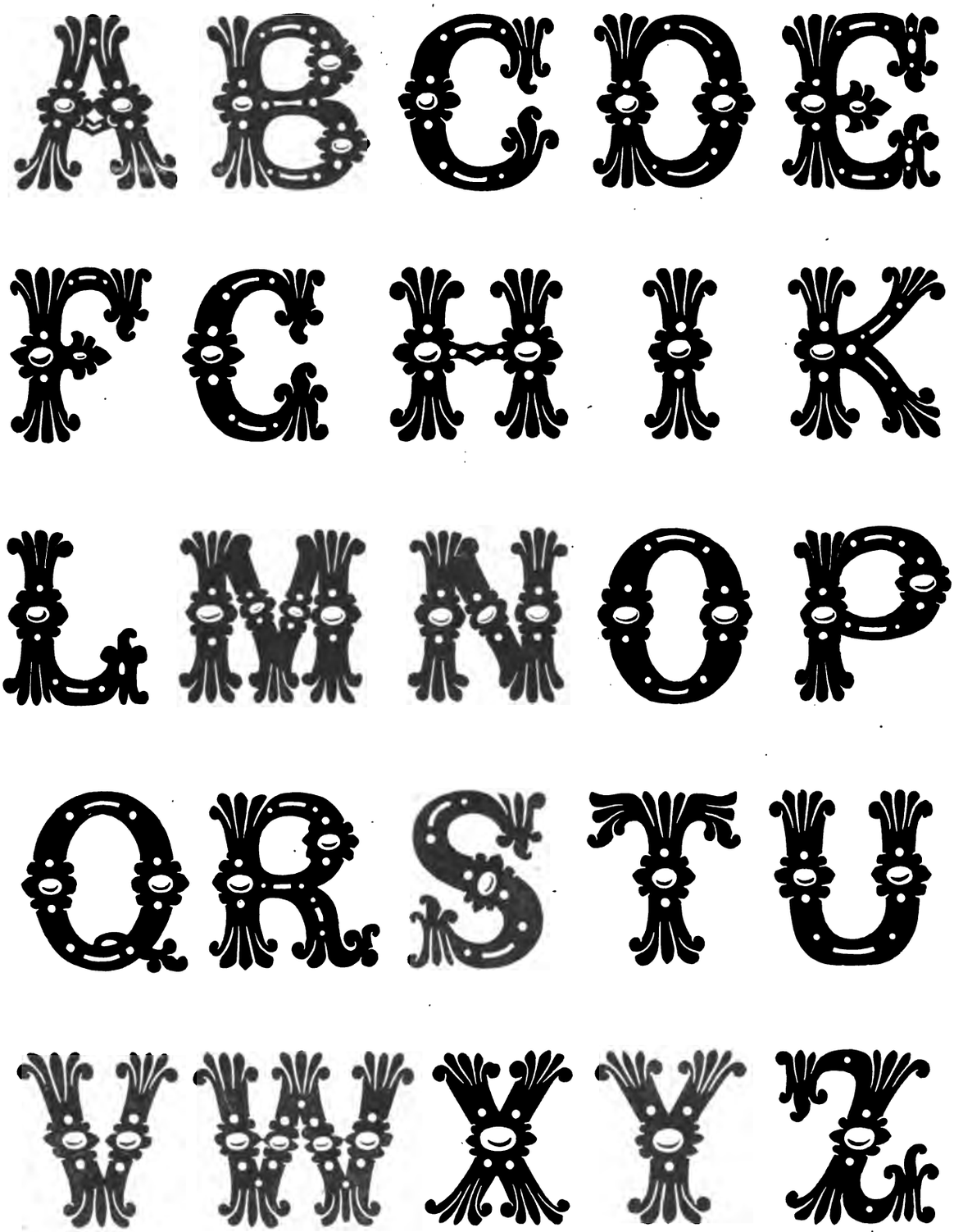
(*To be continued.*)

THE DURABILITY OF ZINC ROOFS.

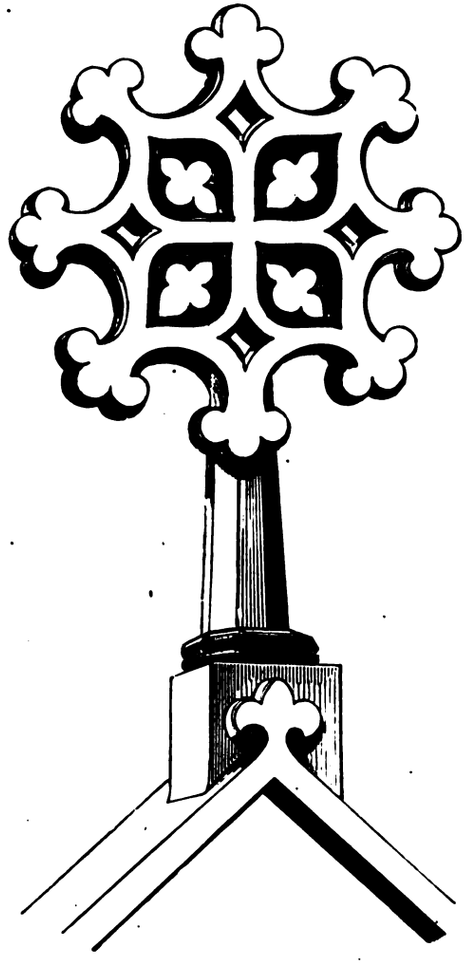
Herr Pettenkoffer, instructed by the Bavarian railways committee, undertook experiments on laminated zinc, with a view to ascertain its behaviour under the influence of the atmosphere, and its consequent durability. For this purpose the German chymist examined a zinc roof that had been constructed twenty-seven years ago. The surface of the metal was found covered with a layer, which consisted principally of oxide of zinc, carbonic acid, and water, or of hydro-carbonate of zinc with small quantities of oxides of iron and lead, mixed up with road dust. The analysis of the hydro-carbonate of zinc shewed that the loss had been, during twenty-seven years, 2·67 ounces of zinc to a square of 10·75 feet, of which about half was carried away by the atmospheric waters of condensation. It is, therefore, calculated that it would require four hundred and thirty-five years to totally destroy a roof of zinc sheets 0·039 of an inch thick. At the termination of this period the whole thickness of metal would be converted into hydro-carbonate, and entirely corroded. Practically, however, no roofs would last so long, for numerous circumstances concur to bring about their rapid destruction. One of the most powerful causes of deterioration is the crystalline structure of the metal, which is corroded along the *facettes* of its crystals, so that oxidation produces at certain points deep cavities and perforations.

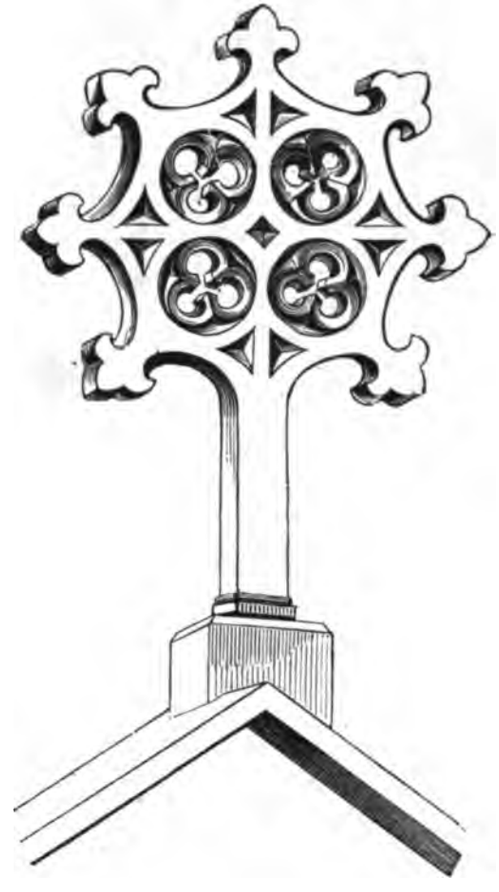
PRESERVATION OF EGYPTIAN ORNAMENTATION.

Rameses, one of the kings of Egypt, erected in front of the temple of the sun at Heliopolis two obelisks, one of which remained there, and the other was carried to Rome at immense cost and trouble, where it is still to be seen in the Piazza del Popolo. As Rameses lived before Moses, who flourished 1550 years before Christ, it follows that the age of the Egyptian obelisk in the city of the Cæsars cannot be less than 3400 years; and yet the ornamentation it bears is as sharp and well defined as it was the day on which it was cut.



ALPHABET (THIRTEENTH CENTURY).





GABLE CROSSES (GOTHIC).

The Application of Colour to the Decoration of Houses.

By E. Lhai.

PROBABLY no subject is so little understood, nor has been more grievously abused, than the application of colour to the decoration of our dwellings. In nearly all but a few first-class houses, and some of the mansions of the nobility, the polychromatic harmony of the rooms with their contents is quite a matter of chance. The landlord, in nine cases out of ten, leaves the house-painter perfectly at liberty in the selection of colours for the woodwork. He may, perhaps, choose paper-hangings of pretty, or neat, or [illegible] but he rarely gives a thought as to whether [illegible] will accord or promote discord with the [illegible] while the tenant, whose furniture may have [illegible] for years, still further, [illegible] of necessity, [illegible] harmony that should [illegible], without which no [illegible] agreeable, nor [illegible] comfortable. Except [illegible] who are afflicted with colour blindness—who [illegible] distinguish blue from yellow, nor red from blue-[illegible] ve is as sensitive affected by harmony or discord colour as the ear is by similar conditions of sc[illegible] We all know what a nuisance it is to have a [illegible] yard grinding out jangling discords in our quiet s[illegible] or to live on [illegible] side of a thin wall while on the [illegible] may be, a young lady is "learning to play," or a [illegible]toed young gentleman "doing the Traviata," or a [illegible]ctor without pupils beguiling away time with the [illegible]Dead March in [illegible] on a cornet-à-piston, or an [illegible]ect seeking consolation for the absence of clients in the deep murmur of a bass viol. From such miseries we seek relief by flight. Nor is the torture continuous, for neighbours are not always be playing and singing, and, thanks to Babbage, the police practically protect us from organs and German bands. But when a constant [illegible]e and irritation is created at home [illegible]e eye, there is no redress, no escape, and the irritation of the delicate organ of vision ruffles the temper and disturbs the pleasant balance of the mind.

It would be a curious and interesting study to examine the influence of colour in house [illegible]on domestic life, and upon the happiness of families, which might be appropriately taken up at their next meeting by the promoters of Social Science. For it may seem strange to suppose that the colour of walls, doors, and furniture can [illegible] happiness of a family, and we [illegible] that they do directly or [illegible] very materially [illegible]. Still it is quite feasible [illegible]ine that when Paterfamilias returns to Clapham from the City, after having the mind kept upon the stretch all day by eager anxiety to make a bargain, or, may be, crossed by failure in the attempt, and the body jolted on the knife-board of an omnibus, his temper is not at all likely to be improved if the eye be offended by the disturbing contrast of colours in his home. Then, if at any time the eye wants repose and not startling effects, harmony and not discord, very probably Paterfamilias is quite unconscious of what it is makes him so ill-tempered in the bosom of his family. He may have an indefinite sense of having an uncomfortable home, but of course the fault is not his; it is all the wife's, and what the fault is he cannot for the life of him tell. No wish expressed is left unsatisfied, as far as practicable. He is lord and master most absolute. His ill-temper and curt replies are allowed to pass without a murmur. They are patiently borne, and set down to that "something in the City which has annoyed him." Still there is no improvement. The sense of being uncomfortable at home becomes more settled and determined. A club is resorted to, and late hours kept. Mrs. Grundy is constantly held up as a pattern wife for keeping such a pleasant, cheerful home. Estrangement creeps in between those who never should be sundered, and Paterfamilias regrets the little house at Camberwell, wondering what can have rendered the new and more costly home distasteful. We think it quite probable that there are things not dreamt of in our philosophy which exercise an influence for good or evil upon domestic life; and there is nothing unreasonable in supposing that one of these is the harmony, or its absence, of colour in our houses.

Until the theory and practice of harmony in colour be thoroughly understood and carried out by those who have the decoration of our homes, the greater part of the expenditure upon furniture will be wasted. That polychromy presents any real difficulty it is rather too late in the day now to assert, and if it be not studied very generally, it is on account of the indolence both of teachers and the public rather than from its abstruseness or lack of attraction. The youth of both sexes spend no inconsiderable portion of their time to learn what is a mere burden to the memory, and can never be of the slightest practical use. If a tithe only of the weary hours passed in getting by heart the names of all the Roman consuls were devoted to master the principles of colour, new sources of enjoyment and utility would be opened that throughout life would be ever fresh and constantly occurrent. How much time is devoted by schoolgirls to acquire a knowledge of music, which charming and agreeable as it is, falls immeasurably short of the usefulness and pleasure that would result from an educated taste in colour! For, among the middle classes, household cares after the honeymoon throw the piano into the shade, while, on the other hand, skill in polychromy may be rendered available to heighten all the calm enjoyments of home and wedded life. The art of dress has been said to be the great study of the female mind—to excel in it the ambition of a woman's life; yet no one can be well attired unless there be harmony between the colours of the different parts of dress. Since Balmoral petticoats have come into fashion, the lamentable results of this ignorance have been made more apparent. One lady is surprised, who loops a purple dress over a green petticoat, that the costume does not suit her; while another, who wears a green dress over a red petticoat, looks charming. In the first the colours are dirty, and the purple acquires a cold, leaden aspect, which reacts upon the fair wearer. In the second the colours are associated in unison and harmony. Then, again, dove or slate colour is a great favourite, because it is what is called a quiet one; but if a dress of this kind be worn, for instance, with a blue shawl, it is made to look faded and impure, depriving it

of its blue tendency without increasing the purity of the red, while with a red shawl it would lose its warmth, which, to a certain extent, is necessary to preserve the proper character of all tints allied to purple. But if the shawl be buff in hue, or have a yellow border, or, better still, be one of the Eastern tissues, in which golden thread is interwoven and made to form a deep fringe, then the yellow will clear the dove colour and bring out all its pleasing characteristics. Another error, very common in female dress, is the contrast of two greens; but to put a pure green beside a tea colour is inevitably to extinguish the latter, or, at all events, deprive it of its distinctive character, by obliterating its green tendency, which is the true source of its utility, and, indeed, of its peculiar merit.

If we have dwelt upon this point, it has been from a desire to enlist that which is generally the most powerful influence in determining the character of interior decoration, among the advocates for the extended study of the principles of colour among all classes of society.

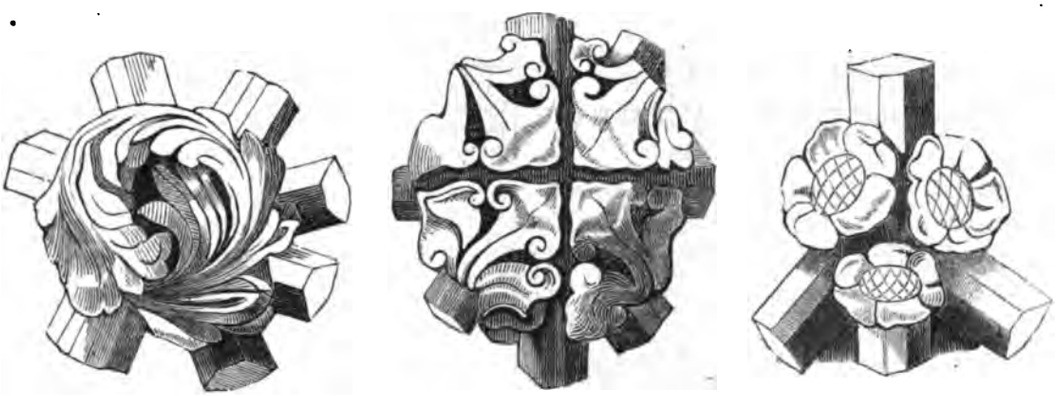
We have said that the study of the harmonies and laws of colour is not difficult. There are but three simple colours, and it is their combinations in various proportions that furnish the infinite varieties of hues which in nature, as well as in art, charm the eye and afford a mysterious gratification to the senses. With these simple colours—red, blue, and yellow—or primaries as they are called, every tint is produced, in combination at times with the pigments black and white, to qualify the first named. Any two of the primaries combined give the secondaries—blue and yellow produce green; blue and red, purple; red and yellow, orange. According to the proportions in which two primaries enter into combination in a secondary, do we have their various hues. As there is present more or less yellow united with blue, we have olive or tea greens; and there is no draper's shopman but would be puzzled to enumerate the members of the family of the greens. A combination of a primary with a secondary gives the third or last class of colours, or tertiaries; for it is evident that there can be no more than three classes, although the hues, of the two last more especially, may be infinite. If we take a secondary to place in juxtaposition with a primary, it will be seen, on reflection, that for perfect harmony to exist between the two it will be necessary that the primary should be that one which does not enter into the composition of the secondary. In that case the harmonising secondary is called the complemental colour to the primary. Thus, between green and red there will be perfect harmony, and green be the complement to red; blue perfectly harmonises with orange, and is its complement; yellow with purple, and is its complement; but if we place green in juxtaposition with blue or yellow, or purple in juxtaposition with blue or red, or orange in juxtaposition with red or yellow, we place the compound in presence of one of its constituents, and the result is harmony, but not perfect.

In a room, therefore, painted green or papered with green upon the walls, the ordinary red curtains and furniture would harmonise, and the perfect harmony would be the further promoted if the primary and its complement were repeated in the pattern of the carpet. But there would be simply harmony if the green papered walls were to be contrasted with yellow or blue curtains, and a carpet in which these two primaries were combined. In a room papered with embossed crimson paper, purple hangings and carpet would be productive of harmony, while green curtains would give perfect harmony. Yellow or blue silk curtains with green-covered furniture would not perfectly harmonise, although they may be seen in many of the most fashionable drawing-rooms. Green walls and purple or orange hangings would be productive of discord, unless by skilful management and modification. The nearer purple approached to blue the less discordant would it be with orange. Thus far we have spoken of two colours in presence, in which case the rules for guidance are simple and easy to be understood. But when three colours are brought in the same neighbourhood, then the difficulty begins. Suppose the discord between purple and orange has been reduced by bringing out the yellow of the orange, the interposition of a yellow positive would throw the orange back again; while the introduction of red would not be at variance with the purple, and would kill, as it is called, the red element in the orange, bringing out its yellow more prominently, to which the purple is complemental. As an example, an apartment wherein the prevailing hues of the furniture and decorations are modifications of a cool purple, orange yellow, and red, is an arrangement of colours more pleasing than purple, orange, yellow, and blue; as the blue would bring out the orange element, and so increase the discord between it and the purple.

Essential to perfect harmony is variation in the tones of colours. If in an apartment all the colours are of the same intensity, the result will be harsh and violent; if all faint, insipid, and washy: so also is the contrast of temperature. Red and yellow being the warm colours, and blue the cold colour, any modifications of the two first would require to have interposed between them the cold colour to bring out their warmth. If you have on a wall or ceiling a light warm tint for a panel, and another for the margin, it would be a mistake to interpose a strong red line, for their warmth would be lost, and they would be rendered muddy; whereas a blue line, being cold, would bring out all their warmth.

Technicologia.

202. *Paste for Architectural Modelling in Paper.*—This paste should be carefully made. Mr. T. A. Richardson, the architect, in his work entitled "The Art of Architectural Modelling in Paper," recommends to every two tablespoonfuls of the best wheaten flour to add a teaspoonful of common moist or brown sugar, and a little corrosive sublimate; the whole to be boiled, and while boiling continually stirred to prevent lumps, till of the right thickness. To stop mouldiness a few drops of some essential oil, as lavender or peppermint, is recommended. This paste is used to produce the needful thicknesses of cardboard; and to fix the whole together, and the several parts in their places, gum must be used, for which the following proportions are recommended. To each six ounces of the best gum arabic add an ounce or less of moist or lump sugar, one teaspoonful of lavender or other essential oil, and a tablespoonful of gin; the whole to be mixed in cold water to the consistency of a thick syrup, no heat being in any way applied.



GOTHIC ORNAMENTS.

Architectural Modelling.

This is an ancient art, though models were made of old to preserve the memory of a building, and not for the purpose of shewing how the design could be worked out before execution. There are many ancient objects in the nature of models of temples applied for various purposes, as articles of decoration or objects of furniture. In the middle ages such models had likewise sundry uses. Models of the Holy Sepulchre were preserved from motives of devotion, and sometimes the statue of a saint or bishop is represented with the model of a church in his hand. Shrines are likewise found so modelled. An early mention of a model for the purpose of architectural study, relates to the year 1846, when San Gallo, the pupil of Bramante, caused to be constructed a model of his proposed designs for St. Peter's at Rome, in order that the whole might be carried out in the same spirit in the event of his death. This model cost for its construction many thousand pounds, but was set aside by Michael Angelo on his appointment to take charge of the works, and he set himself to construct a model of his own design, which was done in a few days at the cost of a few pounds. Wren's model of St. Paul's, now in the South Kensington Museum, is a good example of the practice in the last century. In the Soane Museum are to be found various models, made under the direction of Sir John Soane, or acquired by him; and in the British Museum is a model of the Holy Sepulchre, made at Jerusalem. There are likewise others which our readers will readily remember.

Modelling has not, however, been so much practised by architects in this country as might have been expected, and one reason may be that until late years no public notice was taken of modelling; but now that several architectural museums have been formed, we have specimens such as those to which we have referred, and which serve to stimulate general attention. The model of the Parthenon at the British Museum, and of the Mausoleum there, and the model of the Coliseum at the Crystal Palace in connexion with the others there, have done very much in giving the public, and even members of the profession, a better notion of those buildings, and of buildings of that class, than they could otherwise have obtained. Indeed, much of the best eye education of the public with regard to ancient architecture is obtained from such models. Models of an intended design for St. Paul's are of little value in this sense, but the model of a building not otherwise accessible to us becomes of great use when a controversy arises as to its construction or its decoration. Thus the model of the Parthenon has very much elucidated the questions as to the construction of the statue of the goddess, the lighting of the building, and the decoration of architectural details by polychromy. In truth, more attention has been paid to the theories put forward, because they can be better tested.

The great beauties of a model consist—firstly, in perfect symmetry and correctness of parts, all the angles being clear, well defined, and sharp, the various minutiæ of detail being accurately delineated; and, secondly, to the straightness and evenness of the horizontal and perpendicular lines. The chief difficulty is in the joining of the paper or cardboard by means of a miter, as well as the cutting of lines on the slant, in either a horizontal or curved direction.

With regard to the choice of paper, some care must be taken. Inferior papers are hard, contain knots and other imperfections, and are often gritty, which latter imperfection, by destroying the sharp edge of the knife, prevents the work from having a well-finished appearance. The paper should be firm in texture, though not hard, and not being too spongy would not suck up too much of the wet of the paste used in fastening together the sheets for the several thicknesses needed, thus ensuring their firmness—a matter of great importance; otherwise, in thin strips, consisting of four, five, or more thicknesses of paper, upon their being cut, each would part and defeat the wished-for end. Pure white Bristol board is a tedious, hard material to work in, though the result is very fine.

Grammar of Chymistry.

FOR THE USE OF ARTISTS AND ARTISANS.

CHAPTER IX.—METALLIC BASES OF THE EARTHS.

Glucinium (symbol G, equivalent 26·54), derives its name from γλυκὺς (sweet), in allusion to the sweet taste of the salts of its oxide *glucina* (G^2O^2). This earth is found in the emerald, beryl, and euclase. It is a soft white powder, insoluble save by the gas blowpipe, causing neither taste nor smell, but adhering to the tongue. It does not affect vegetable colours, is insoluble in water, but forms a paste with that liquid. It is soluble in the solutions of the fixed alkalies, in its carbonates, and in the other alkaline carbonates. Its salts are for the most part soluble in water, but the greater part are not crystallizable. The *carbonate*, *phosphate*, *seleniate*, and *succinate* are insoluble. With the simple combustibles it does not combine, nor yet with the metals, but it readily combines with all the acids, even with the hydrosulphuric.

Yttrium (symbol Y, equivalent 32·25) is of a darker colour than *glucinium*, which it resembles in oxidibility. The earth of which it is the base, *yttria* (YO), was discovered in 1794 by Gadolin, in a mineral called after him, *gadolinite*, found at Ytterby in Sweden. The other minerals in which it has since been found are exceedingly rare. It is considered a protoxide. Its density, which is greater than *barytes*, is 4·842. Neither taste nor smell is produced from it, nor has it any effect on vegetable colours. In water it is insoluble, but absorbs and strongly retains that fluid. Its salts have an amethystine tint, but when quite pure are colourless. They have a sweet taste. Those which are soluble, the *sulphate*, *nitrate*, *hydrochlorate*, and *acetate*, are crystallizable, and those which are insoluble, the *phosphate*, *arseniate*, *carbonate*, *seleniate*, *oxalate*, *tartrate*, *succinate*, and *citrate*, are neutral.

Thorium (symbol Th, equivalent 59·88). The discovery of this element has been already mentioned. It receives its name from the Scandinavian deity, Thor. The black mineral obsidian, since called thorite, from which it is obtained, contains 57 per cent. of *thorina*. In oxygen it burns with a degree of brilliancy which is quite extraordinary, and the resulting oxide does not exhibit the slightest trace of fusion. *Thorina* (ThO) has a density, 9·402, superior to that of all other earths. It is distinguished from the other earths by the following properties:—1. Its sulphate is precipitated from its solution by raising it to the boiling temperature; and dissolves again, though slowly, in cold water. 2. It is insoluble in caustic alkaline leys. 3. It forms with potash a double sulphate, which is soluble in water, but insoluble in a saturated solution of sulphate of potash. 4. Its salts are precipitated by prussiate of potash; and, 5. When calcined it continues white, and it does not form a coloured bead before the blowpipe, either with borax or with biphosphate of soda.

Zirconium (symbol Zr, equivalent 33·67) has the lustre of iron, and is compressed into scales which resemble graphite. When heated in air, it takes fire below redness.

By analyzing *zircon*, a mineral found in the island of Ceylon, Klaproth, in the year 1789, discovered "the new" earth of which this metal is the base, and which he called *zirconia* (Zr^2O^3). The constitution of this earth is not known for a certainty, but is believed to be analogous to that of alumina. It is a white earth, and its density is 4·3. It has neither taste nor smell, and feels gritty between the fingers. It is insoluble in water, but has a strong affinity for that liquid. When slowly dried, after being precipitated from a solution, it retains about one-third its weight of water, and assumes a yellow colour, with some degree of transparency, which gives it the appearance of gum arabic. The greater part of its salts are insoluble in water, but the *hydrochlorate*, *nitrate*, *acetate*, *benzoate*, and *malate* are soluble. These salts have a harsh, astringent, disagreeable taste.

(*To be continued.*)

Architectural Glossary.

(*Continued from page* 64.)

PROFILE. The vertical section of a body: signifies principally the contour of architectural members, such as bases, cornices. &c.

PROJECTURE. An out-jetting; a prominence beyond the naked outline of a wall, column, &c. Called by builders a *sailing over*.

PROSTYLE. A portico in which the columns stand in advance of the building to which they belong.

PULVINATED. When the frieze is swelled in the modern or Italic Ionic, it is said to be *pulvinated* or *cushioned*.

PURFLED. Ornament representing drapery, embroidery, or lace-work.

PUTEAL.—The marginal stone of a well.

PYRAMIDION. The small flat pyramid which terminates the top of an obelisk.

QUADRA. A square border of frame to a basso relievo, panel, &c.; also the bands or fillets in the Ionic base on each side of the scotia; also the plinth or lower member of the podium, or continued pedestal.

QUADRELS. Artificial stones of square form, whence their name.

QUARREL. A square or lozenge-shaped piece of glass used in lead casements.

QUARTER ROUND. Same as *ovolo* (which see).

QUARTERING. A series of quarters, as in a partition.

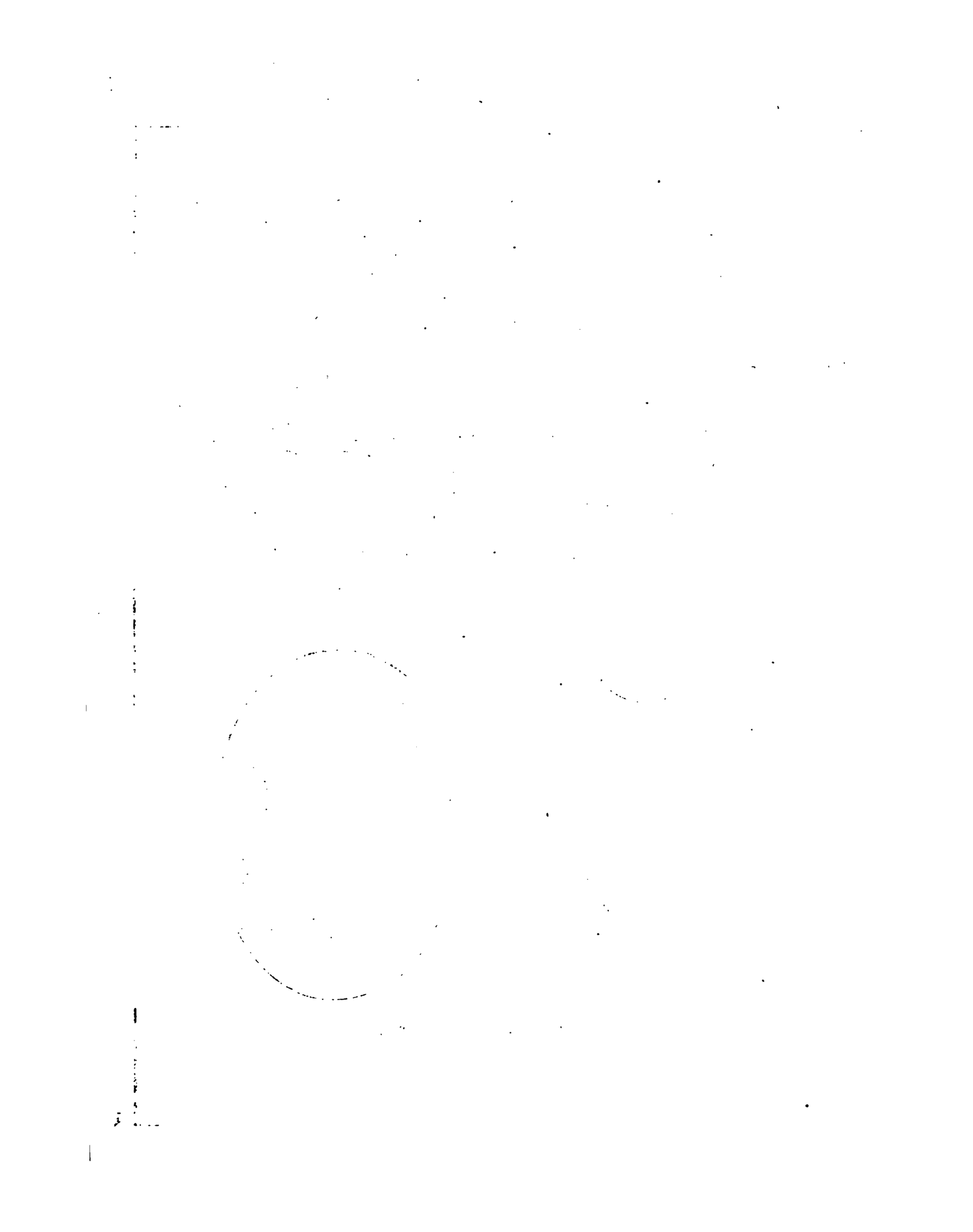
QUARTERFOIL. A form disposed in four segments of circles, found only in the windows, panels, &c., of Gothic architecture. So called from its resemblance to an expanded flower of four petals.

QUARTERS. Small vertical timber posts, used instead of walls for the separation or boundary of apartments.

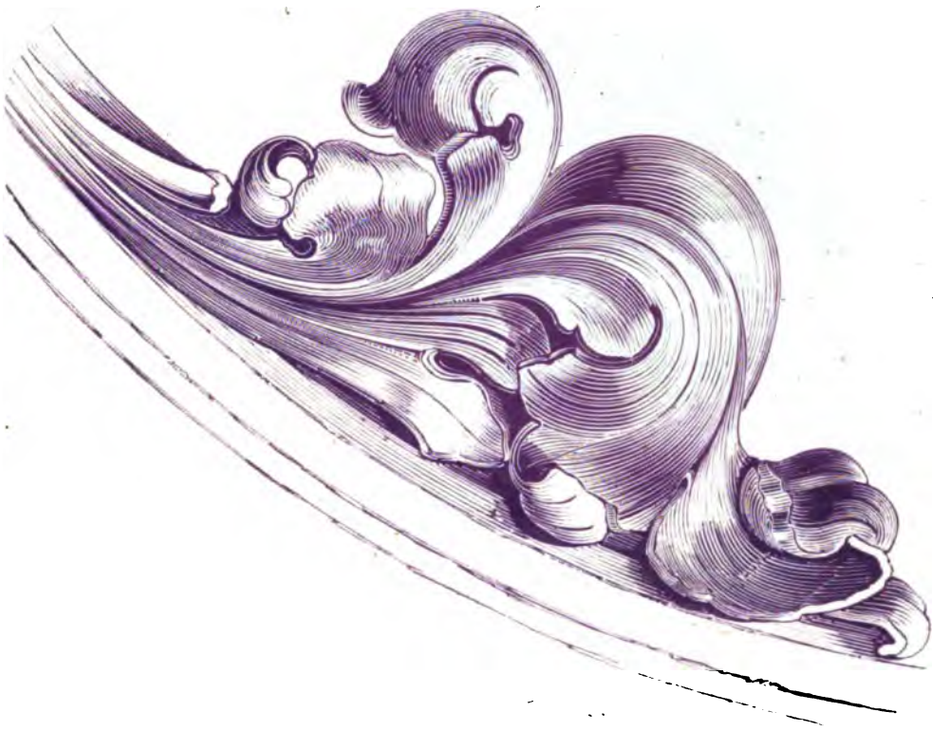
QUIRK. If a piece were taken out of the corner of a ground plot or floor, such piece is called a *quirk*. *Quirk moulding* is a small acute angle or recess, much used between mouldings; the hollow under the *abacus*.

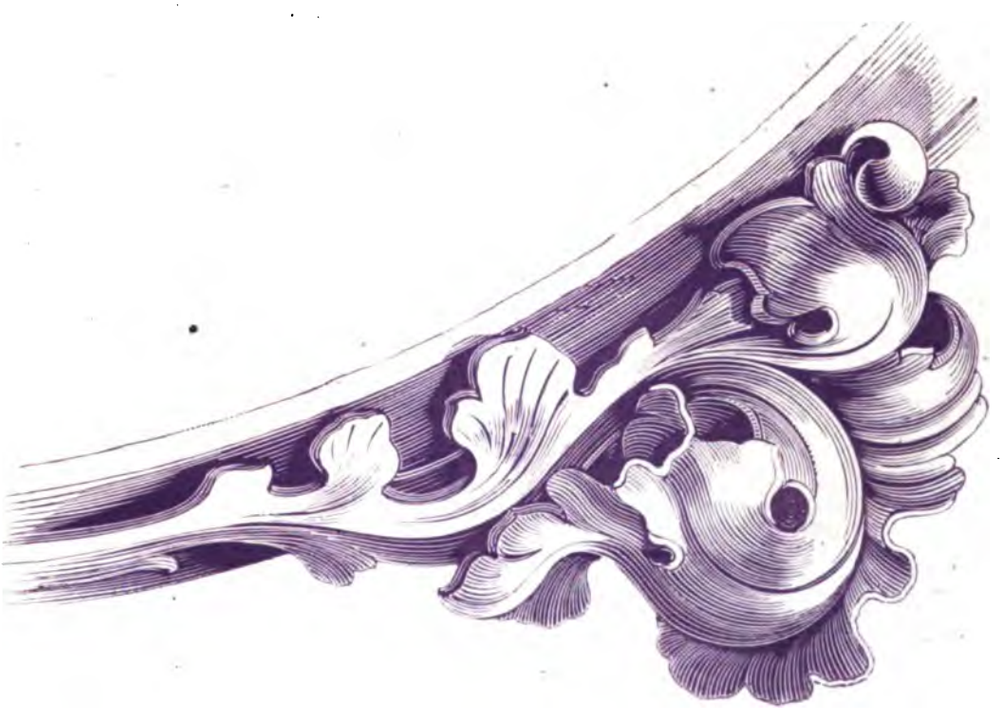
QUOIN. Any external angle. The angular courses of stones raised from the naked of the wall at the corner of a building are called *rustic quoins*.

(*To be continued.*)



MONOGRAMS AND CYPHERS.





CROCKETS (GOTHIC).

The Architecture of London.

A MAGNIFICENT edifice, a palace of official buildings, "a dream in stone," has been built in Gothic architecture, at a cost of more than a million sterling, on one of the worst sites in Europe, on which it has conferred an importance otherwise unattainable. That building, with Westminster Hall and Abbey, have impressed a distinct architectural character, as well as historic interest on the locality. To such an extent is this presiding influence felt that—

"As by the stroke of the enchanter's wand,"

Westminster Bridge disappears as a Roman, and rises as a Gothic structure.

Although the hand of genius has in a great measure triumphed over the difficulties of the situation, it is still to be regretted that some other site was not chosen than the penultimate corner of Westminster—a mere slice reclaimed from the mud and exhalations of the Thames, below the common level, and hemmed in by Westminster Hall and Abbey. But it is done: it is a great fact, from which much wisdom may be derived, and we now know what it is to act upon an epigrammatic rather than a prudential opinion; one that fills the ear and satisfies the sentiment without convincing the judgment. "It is good to build upon the old foundation."

The Mediævalists are further strengthened by what has been done close at hand on "the finest site in Europe"—Trafalgar Square. There we see the converse of the preceding experiment. Through want of means, or of genius, a building has been erected, to which the excellence of the site only gives a stronger condemnation; and such is the contagion of bad example, that everything that has since been added has either been in worse taste, or, if good in itself, utterly incongruous with the main feature, and, indeed, with all around it.

Let any one walk up Whitehall northward, and see (if he can see) the National Gallery behind the base of the Nelson monument, and he will at once perceive the column commemorative of our greatest naval hero expand into colossal proportions, while those in the portico of the National Gallery dwindle into posts, and the entire building looks like a gigantic baby-house. Perhaps the architect was more unfortunate than censurable. The ministry of the day gave him a problem beyond the power of plastic art to solve—given £50,000 and a few old columns from Carlton House, and "the finest site in Europe," to build a national gallery. A gallery was erected, but the measure and the means precluded its being national.

Thus, on the one hand, the Mediævalists may point to the triumph of Gothic architecture over all the difficulties of site and position at Westminster, and with the other to the lamentable failure of Classic art in Trafalgar Square, notwithstanding every local advantage; and they may further shew the gigantic fragment, the banqueting-house at Whitehall, in unison with nothing around it, looking down obliquely on the little "round-house" opposite; the pitted elevation of the unimposing Horse Guards; the new-fronted Treasury, which, though an elegant building, betrays some paternal defects; and may say with apparent reason—"Can you forbear to continue what Sir C. Barry has so magnificently begun? You see at Westminster a specimen of what London may one day be under our guidance—a city which shall be the realisation of 'a dream in stone.'"

Some of our Italian club-houses are very handsome; but importance and extent are wanting to fill the mind and impress the imagination, as the Palace of Westminster does; and the absence of those elements of success and grandeur is a condemnation neither of the style nor the architects.

London, with its fungous growth, its enormous, various, and yet unpicturesque population—its incessant activity—its manufactures and shipping—its parks and squares—its districts of fashion and of business—its air of security and freedom—what has it in common with our ideas of a Mediæval city?

It is so little like one, that, with the exception of some half-dozen buildings, it might have been built and inhabited within a century.

If it is judicious to invest a great city with a Mediæval character, how is it, it may be asked, that Paris presents so different an appearance? France has passed through the same feudal condition as England; indeed, those institutions were exhibited on the Continent more vividly than in this country; she has Mediæval buildings of the same periods, and as beautiful as those of England; and the Romish religion still prevails there, while we have long disclaimed its authority; in addition to which there exists to the present day a more Mediæval character about the ancient quarters of Paris, in their lofty high-roofed houses and narrow streets, than in the old parts of London (if, indeed, London can now be said to retain any antiquity); and yet all the main improvements in Paris, which form a new wonder of the world, are Classic, or based on Classic forms. Do we pretend to more taste than the people of France?

There are many cities on the Continent whose names alone awaken a sort of Mediæval echo. Oxford and Cambridge, too, are Mediæval, not merely from their buildings, but from their historic associations, the nature of the studies, the academic dress, the air of seclusion, "the cloisters pale"—the absence of busy and progressive life.

But London requires a style of architecture, if any one is to prevail, of a character as cosmopolitan as possible—one that shall speak to the judgment and imagination, rather than to the imagination alone in its most sombre moods.

The Classic style has that character. It originated with, or at least was adopted by, a people, who had no narrow or sectarian views, or conventional types and symbols essential to its development. As they annexed province after province, so they imposed Roman laws and civilisation, and erected Roman buildings. The world is full of their remains—they are confined to no country or period—they are almost as much connected with Christian as with Pagan life; and modern times have seen a new creation of them whose association is the triumph of letters over barbarism.

Supposing, therefore, for the sake of argument, that the two styles were of equal beauty; confessedly our association with the one would be that of enlightenment and progress, as exhibited at two different periods of the world, and on a scale of unparalleled grandeur: with the other of superstition and barbarism, confined to a particular epoch, and to poor and scanty populations.

The associations are as distinct as day and night; and in the nineteenth century, when superstition and fallacies of every kind are disappearing before the illumination of the progressive mind—when education seems the great panacea—our teaching, even by material things, our "sermons in stones," should be associated with light rather than darkness.

Painted Decorations.

Chromic or coloured embellishments in architecture have their origin in remote antiquity. The Egyptians painted their temples and habitations, as did several other of the primitive Eastern nations; and the practice descending, became common alike to the Classical and Mediæval ages. In that of England, properly so distinguished, such or similar decorations occur very early. Among the Anglo-Saxons, "pictures of saints," with "embroidered clothes," used as hangings — "pictas vestes"—as they were called, and painted sculptures, ornamented the walls and altars of churches so early as the latter part of the seventh century, following a custom coevally and long antecedently exhibited throughout the adjacent continent. At the commencement of the ninth, sanctioned by authority and example derived from this source, we find the introduction of such pictures or paintings the subject of express ecclesiastical injunction. By a canon of the second council of Calcuth, or Celicyth, in Northumberland, held A.D. 816, every bishop dedicating a church, is strictly required to see painted on the walls or altars thereof the figure or picture of its patron saint. As a relative illustration, it may be noted also that in a Saxon MS. of this age, quoted in Muratori Antiq., are contained (among others relating to similar arts) directions for staining glass, so as to form "pictures of mosaic work," with which it would seem many of the altars and shrines of this period, in imitation of the foreign glass and other mosaics similarly applied, were constructively and otherwise ornamented.

Of the extent of these and the like applications of painting and mosaic during this and the next succeeding century, little or no direct and authoritative record now exists, though indications of the adoption of such are to be traced in the descriptions of the altar tabulæ, and other similar gifts, made to the early Saxon church. Approaching the Norman era, however, an extended use of "picture work," under which term both these forms of decoration were at this time included, is decidedly and distinctly established. "Superb picture work," intermixed with gold, is described as among the works performed by the Saxon Archbishop Aldred to his cathedral of York in 1061, and the pictured ornaments of the church of St. John, at Beverley, of a corresponding age, are also alluded to by the same authority. At a little later date, the second, or Lanfranc's cathedral at Canterbury, had its ceiling "egregiè depictum." Subsequently, Malmesbury also notices its "pictured roof," and in continuation, the choir paintings at Ely, by Bishop Ridel, and the ceiling at Peterborough, may be adduced, which latter, erected according to general authority between the years 1177 and 1199, has descended (restored) to the present day.

From the period to which the above notices have reference, pictured or painted decorations of several kinds appear to have been commonly introduced, and are matters of frequent and particular account.

During the long reign of Henry III., occupying the whole of the first half of the thirteenth century, directions as to such are numerous and special, in connection with the various works ordered by this king to be performed at his several palaces and residences at Westminster, Northampton, Guildford, Winchester, and elsewhere.

In 1220, the fourth year of this reign, the king's painted chamber, "cameram nostram depictam," in the castle of Winchester, is referred to. In 1232, the sixteenth, the figures of the four Evangelists, with those of St. Edward and St. Edmund the king, are ordered to be painted in the chapel of the palace, at Woodstock. Again, in 1233, the following year, a mandatum, addressed to the sheriff of Southampton, directs the king's wainscoted chamber "cameram regis lambruscatum," in the castle of Winchester, to be repainted with such "histories and pictures as were previously depicted there;" and there are other further notices almost yearly throughout this reign.

In the following reigns of Edward II., and Edward III., similar applications continue to be recorded in the descriptions of the decorations by these kings, to the palace, the chapel of St. Stephen, and the abbey church at Westminster, as well as in those referring to others performed by several of the higher ecclesiastics of this period to their palatial residences and churches. Early in the reign of Edward II., Bishop Walter Langton caused the coronation, marriages, wars, and funeral of his patron, the late king (Edward I.), to be painted on the walls of his episcopal hall at Lichfield, then newly built. About the same time also, Adam de Sodbury (Abbot) adorned the nave roof of Glastonbury with "beautiful paintings;" and in 1335, 1336, and 1339, "novæ picturæ" are mentioned among the works at Ely.

Henceforward it is hardly necessary to follow the order of further reference, or to recur to the numerous additional evidences that might be adduced of the continued and increasing admission of painting and colour during this and the fifteenth and sixteenth centuries. Many examples yet remain, and sufficiently exhibit both the universality of the practice throughout those periods, and its great beauty, discriminately applied, as an accessory enrichment in our ancient architecture.

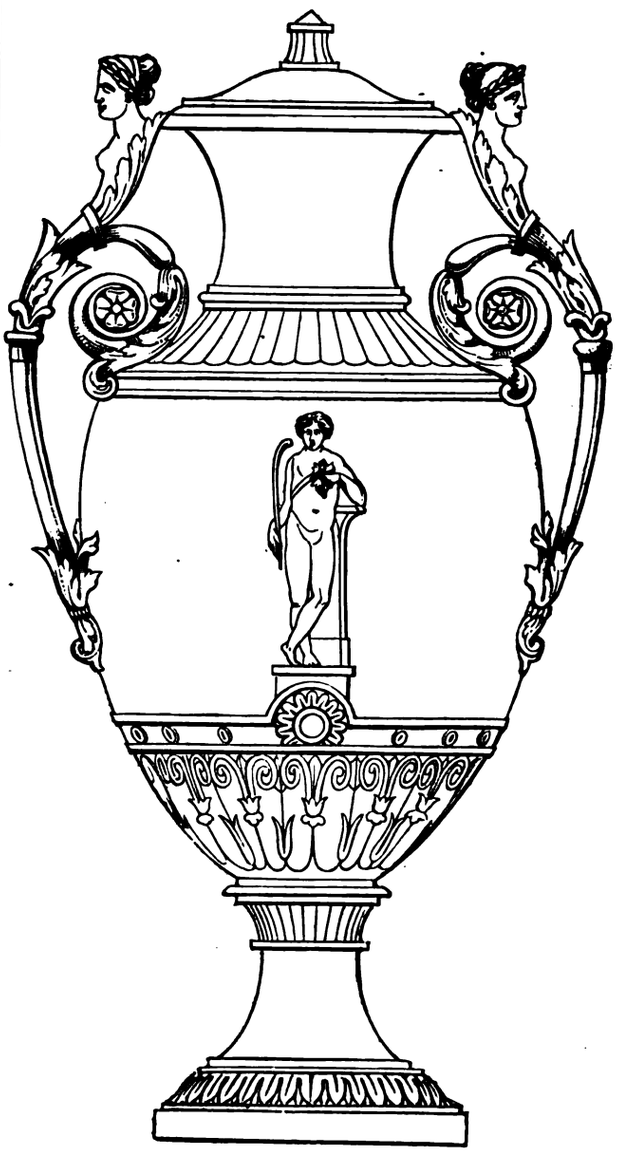
PAPER FROM BARK AND WOOD.

The women of Fiji make paper from the inner bark of the mulberry tree. This paper is an article of barter amongst the natives of Fiji, and a few yards of common calico will purchase a considerable quantity. It is used for curtains, tablecloths, and other purposes; and it is thought that probably the fibrous material of the mulberry tree might be suitable for making writing, printing, and other useful commercial papers. Another mode of making paper has been discovered by a French gentleman, an amateur in chymistry. It is simply by boiling slices of wood with a certain quantity of mineral and vegetable alkali. If the statement of the inventor may be relied on, he can produce, from 54 kilogrammes of slices of fir-wood, and 5 kilogrammes of alkali, a ream of very large paper, as white as snow and as fine as silk.

Value of a Bit of Knowledge.

In the Piazza before St. Peter's at Rome stands a beautiful obelisk. It was brought from the circus of Nero, where it had lain buried for ages. It was one entire piece of Egyptian marble, 72ft. high, 12ft. square at the base, and 8ft. square at the top, and is computed to weigh above 470 tons, and it is supposed to be 3,000 years old. Much engineering skill was required to remove and erect this piece of art; and the celebrated architect, Dominico Fontane, was selected and engaged by Pope Sextus V. to carry out the operation. A pedestal, 30ft. high, was built for its reception, and the obelisk brought to its base. Many were the ingenious contrivances prepared for the raising of it to its last resting place, all of which excited the deepest interest among the people. At length everything was in readiness, and a day appointed for the great event. A great multitude assembled to witness the ceremony; and the Pope, afraid that the clamour of the people might distract the attention of the architect, issued an edict containing regulations to be kept, and imposing the severest penalties on any one who should, during the lifting of the gigantic stone, utter a single word. Amidst suppressed excitement of feelings and breathless silence, the splendid monument was gradually raised to within a few inches of the top of the pedestal, when its upward motion ceased; it hung suspended, and could not be got further; the tackle was too slack, and there seemed to be no other way than to undo the great work already accomplished. The annoyed architect, in his perplexity, hardly knew how to act, while the silent people were anxiously watching every motion of his features, to discover how the problem would be solved. In the crowd was an old British sailor; he saw the difficulty and how to overcome it, and with stentorian lungs he shouted, "Wet the ropes!" The vigilant police pounced on the culprit and lodged him in prison; the architect caught the magic words, he put this proposition in force, and the cheers of the people proclaimed the success of the great undertaking. Next day the British criminal was solemnly arraigned before his Holiness; his crime was undeniably proved, and the Pope, in solemn language, pronounced his sentence to be—that he should receive a pension annually during his lifetime.

GREEK VASE.



Technicologia.

203. *Artificial Wood Mouldings. Similibois.*—An invention has been made public in Paris, which promises to come into vogue for interior decoration and ornament. The inventor, M. Gerard, has already exhibited specimens which are regarded as eminently successful, and include a head of the Virgin, draped, half life size, the head of a bacchanal, quarter size, a bunch of flowers in low relief, and a copy of a Gothic panel from the choir of Notre Dame. The mode of operation is as follows:—A matrix is formed of the object to be produced, of any convenient material, and then a composition of one third sawdust, one-third phosphate of lime, and one-third of any suitable resinous or gelatinous matter. When the matrix or mould—which should be elastic if the original be under-cut—is formed, two layers in succession of the composition are spread over the mould with a paint brush, and will be found sufficiently dry for removal in the course of half an hour. A panel of about a foot square of this material may be made for about 9d. M. Gerard, with his associate, M. Ronveer, moulded the sculptured wood-work of Notre Dame, which presented a total area of 170 square yards, in a month.

Cost of Decorating Houses with Paintings.

Sir Peter Paul Rubens received for his painting of the grand *Plafond*, at the Banqueting House, Whitehall, the sum of £4000. The space covered by this painting is about 400 yards, so that he was paid nearly £10 a yard. Sir James Thornhill, the first Englishman who received knighthood for his ability in art, was paid only £3 a yard for the laborious work on the ceiling of Greenwich Hospital, and only £1 a yard for painting the ornaments on the walls. This employment he was appointed to in the reign of Queen Anne; but the work was not completed until the reign of King George I. He commenced in 1708, and finished in 1727, and was paid altogether £6685.

The valuation of the work, after many attempts to screw down the painter, was made by the directors of the hospital, after consulting the following artists then residing in London—Vandervelt, Cooper, Richardson, Sykes, and Degard—who decided in favour of Sir James, and reported that the performance was equal to anything of the kind in England, and superior in the numbers of figures and ornaments.

"The Duke of Montague," says Sir James Thornhill, in his memorial to the commissioners for building the hospital, "paid Monsieur Rosso, for his saloon, £2000, and kept an extraordinary table for him, his friends, and servants, for two years, while the work was doing, at an expense estimated at £500 per annum."

Signor Verio was paid for the whole palaces of Windsor and Hampton Court ceilings, sides, and back stairs at 8s. a foot, which is £3 12s. a yard, exclusive of gilding, had wine daily allowed to him, lodgings in the palaces, and, when his eyesight failed him, a pension of £200 per annum, and an allowance of wine for life.

Signor Rizi had of the Duke of Bedford £1000 for painting three rooms; for the little chapel at Bulstrode, £600; from Lord Burlington, for his staircase, £700; Signor Pellegrini, of the Duke of Portland, for work in his house £800, and for a small picture over a chimney-piece, £50; of the Earl of Burlington, for the sides of his hall, £200.

Other instances might be given to shew the large amount of employment this now comparatively unused description of house-decoration afforded to artists of ability.

Grammar of Chymistry.

FOR THE USE OF ARTISTS AND ARTISANS.

CHAPTER IX.—METALLIC BASES OF THE EARTHS.

Aluminium or *aluminum* (symbol Al, equivalent 13·72). This element is named from *alumen*, the Latin term for alum, and, like magnesia, is obtained from its chloride by the action of potassium. Alumina fused with potash being submitted to the action of voltaic electricity, metallic globules are obtained, consisting chiefly of potassium, but which, when carefully separated and again oxidised, afford both potash and alumina.

Alumina (Al^2O^3) is the only degree of oxidation of which aluminium is susceptible. This earth, to which Morveau gave the name of alumina, is obtained in the state of the greatest purity from alum. It forms the characteristic ingredient in clays and muds, which are indebted to it for their plastic properties. It forms also a part of many minerals. It exists pure in the corundum genus, of which the sapphire and ruby are species.

Much of its utility in the arts arises from its ready power of union with other earths by fusion—with lime, barytes, strontia, magnesia, silica, and other similar bodies. From its property of uniting also with some of the metallic oxides by fusion, it forms enamel of different colours.

It may thus easily be imagined how numerous and important are the uses of alumina and its compounds in the arts and manufactures. Every variety of porcelain consists of some combinations of argillaceous and silicious earths. Silica, it is true, predominates in the best porcelain clays, yet it is upon the alumina that the essential properties of the compound depend. It is to this latter cause that the clay owes ductility in working and tenacity in baking.

The singular properties of alum are taken advantage of for the following purposes:—To render wood fireproof; to aid the separation of the serous and watery parts of cream in churning butter; to give hardness to tallow in making candles; in silvering and lacquering on copper and brass; in clearing turbid water; in tanning and dyeing the finer kinds of morocco leather; in adding to the tenacity of bookbinders' paste, and helping to preserve it; in dyeing cotton goods (as it both prepares the vegetable fibre for receiving the colours, and aids the formation of an actual chymical combination between its own base, the colouring matter, and the cotton that is to be dyed). In medicine it is applied both internally and externally as an astringent.

(*To be continued.*)

Architectural Glossary.

(*Continued from page* 68.)

RAMPANT ARCH. One the abutments or springings of which are not on the same level.

REGLET. A flat narrow moulding, used chiefly to separate the parts or members of compartments or panels from each other, or to form knots, frets, or other ornaments.

REGULA. A band below the *tænia* in the Doric architrave.

REINS (of a vault). The sides that sustain the arch.

REREDOS. The screen or division wall that, in old churches, is placed behind the altar, rood-loft, &c.

SACOME. The exact profile of a member or moulding.

SCAMILLUS. A small plinth below the bases of the Ionic and Corinthian columns.

SCAPE or SCAPUS. The shaft of a column; also, the little hollow, above or below, which connects the shaft with the base, or with the fillet under the astragal.

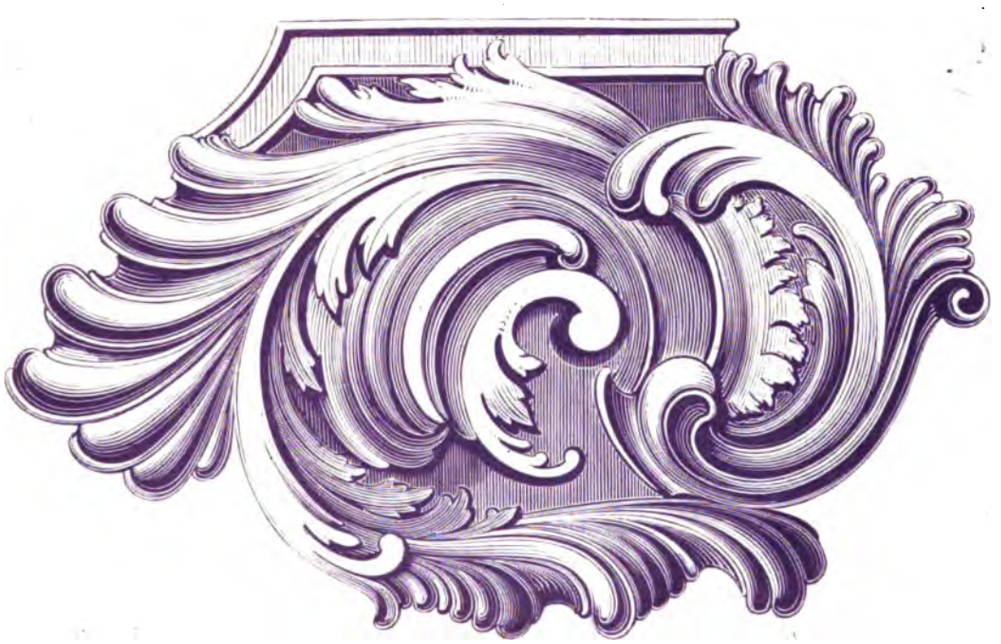
SCOTIA. The hollow moulding in the base of a column between the fillets of the *tori*; called also *trochilus*.

SCROLL. An ornament convolved or spiral. The term is applied also to the volutes of the Ionic or Corinthian capital.

SHAFT. The cylindrical part, or rather body, of a column, between the capital and the base. It is also called the *fust*, *trunk*, or *body* of the column.

SHANKS. The space between two channels of the Doric triglyph, sometimes called the legs of the triglyph.

(*To be continued.*)



CENTRE PIECES LOUIS FOURTEENTH.

COMPOSITE CAPITAL.

Method of Detecting Adulteration in Oils.

TO M. Heidenrich, pharmacien of Strasburg, it was some years since proposed to decide, whether the adulteration of different oils could be ascertained by definite chymical tests. It then became an object of research with him to find out some method of proceeding, which would enable those who are not *au fait* at chymical experiments, to detect these adulterations, by furnishing some accurate characteristic test which might be employed without much trouble, or requiring nicety of manipulation; and he therefore directed his attention to the three following series of experiments:—

1. By observing the peculiar odour evolved by each oil when gently heated.

For this purpose he suggested that a few drops only of the oil under examination be exposed for some moments, in a small porcelain basin, to the flame of a spirit-lamp. The odour which is evolved immediately suggests that of the plant or animal from which it has been obtained; and this characteristic is valuable, if observed in conjunction with the genuine oil, and furnishes accurate indications of the presence of linseed and train oils in any mixture.

2. By the action of concentrated sulphuric acid on oils.

By mixing a small quantity of concentrated sulphuric acid with some oil (in the proportion of about 1 to 2 parts of the former to 100 parts of oil), very intense action immediately ensues, the temperature increases, and the mixture becomes coloured. A plate of white glass being laid over a sheet of white paper, if we place on the former from 10 to 15 drops of oil, and then add thereto one small drop of sulphuric acid of 66°=1·632, sp. gr., a colour will soon be produced without stirring, differing according to the oil employed. In the case of rape oil, there will gradually form, at a certain distance from the drop of sulphuric acid, a greenish blue ring; whilst towards the centre, where the action is more violent, light yellow brown streaks may be observed.

The expressed oil of black mustard seed likewise assumes a tinge of bluish green; but the quantity of oil must, in this case, be increased to 25 or 30 drops. In train oil, obtained from the whale or stock-fish, a very peculiar motion occurs, commencing at the centre and extending to the outside, whilst a red colour is observed, which grows more and more vivid, until after ten or fifteen minutes, when the margin assumes a violet tinge, which, in the course of about two hours, becomes uniform throughout the mixture.

Olive oil instantly assumes a pale yellow colour, which afterwards becomes yellowish green. In poppy oil, and that obtained from sweet almonds, the colour approaches to that of the greenfinch, and afterwards becomes of a dead yellow hue. In linseed oil, a drop of acid produces a beautiful dark brownish red web, which is gradually converted into a brownish black. Tallow oil (called by the trade "oleic acid") is rendered brown. If, instead of allowing the sulphuric acid to act on the oil undisturbed, both fluids be stirred up with a glass rod after adding the drop of sulphuric acid, the phenomena mentioned appear in different order. Rape oil then assumes a uniform brown colour, without a tinge of red; and if, instead of one drop of acid, five or six are added, and mixed with oil, the whole mass becomes of a dead brown red colour, not very intense, remaining green only on the edges.

By doubling or tripling the expressed oil of black mustard seed, the quantity tested gives rise to similar action, with the exception that the colour is somewhat less bright. Train oil instantly assumes, when stirred, a lively brown red colour, which finally passes into dark brown and violet, without a hue of green. If mixed with five or six drops of acid, the colour is much more intense, and the violet colour sooner appears. Seal oil assumes a yellowish gray colour. If, however, thirty drops of oil are taken instead of ten, a colour slightly approaching to green blue also appears, so that one drop more changes into gray. On the addition of five or six drops of acid, it receives a lively orange yellow tint. The oils from the olive, poppy, and sweet almonds, all assume a yellow colour, more or less dingy or grey: and, by the addition of more acid, the action is rendered far more violent.

If linseed oil is stirred with the rod, as before mentioned, a brownish black lump forms, and, by adding five or six drops of acid, the whole forms a resinous, black, and persistent mass. It is true that the other oils likewise become plastic by the addition of greater or smaller quantity of acid; none, however, to a similar degree, and with a colour so black as linseed oil. The oil obtained from tallow assumes a dark dirty brown colour, which does not vary in tint by the addition of more acid. In trade it seldom occurs that a better oil is mixed with an inferior. Oil of almonds, olives, and codfish oil, will, therefore, never be used adulterating rape oil, but probably train, or perhaps linseed oil, and sometimes poppy oil. If we are led, therefore, by the odour to infer an adulteration—for instance, by train oil, which occurs the most frequently—it is only necessary to place from ten to fifteen drops of rape oil, the purity of which is undoubted, together with as much train oil, and an equal quantity of the oil whose purity is suspected, and to add to each of them a small drop of sulphuric acid. From the colour produced an inference may be drawn as to the purity of the oil, and by the difference of tinges from the vivid red of the train oil, and the bluish green of the rape oil, the extent of adulteration may be ascertained. In this manner have been detected adulterations made with half the quantity of an inferior oil; and the aræometer bore further testimony to the precision of my observations.

In undertaking an experiment, the commencement of the re-action must be accurately observed, with the several oils placed beside each other; for the colours, after a quarter of an hour has elapsed, are less distinct, and the mixture should, for the purpose of attaining to greater certainty in the first experiment, be left undisturbed; in a second stirred with the glass rod. It is likewise necessary to avoid employing more than one drop of acid to ten drops of oil, since otherwise the re-action which ensues is too violent. If the presence of linseed oil be suspected in train oil, this will be discovered if the mass is left undisturbed, by a rather intense brownish red colour; if disturbed, by a brownish

black colour. The intensity of the latter is increased by the increased addition of acid, and also the consistence of the moisture.

The adulteration by poppy oil, is seldom met with in commercial rape oil, because it is commonly much dearer than the latter; but when it is done the colour produced is of a very slight bluish green, approaching somewhat to yellow, but sufficiently distinct to admit of an inference being drawn, as to the adulteration, with perfect certainty. In such cases, the specific gravity of both oils must be received as the sole criterion for identifying them.

It has been reported that tallow oil has several times been mixed at Paris with rape-seed oil: besides the brownish colour produced by sulphuric acid, the tallowy smell, the brown colour, the acid re-action, and last, although not least, its density, which is less than any other of the fixed oils, are such decisive characteristics that we must be blind indeed if we do not instantly discover this fraud.

Grammar of Chymistry.

FOR THE USE OF ARTISTS AND ARTISANS.

CHAPTER X.—METALS WHICH ABSORB OXYGEN AT HIGH TEMPERATURES, AND DECOMPOSE WATER AT A RED HEAT.

Manganese (symbol Mn, equivalent 27·72). The most abundant ore of this element is a heavy, black, earthy substance, found in Devonshire and other parts of England, long known as *magnesia nigra*, from its fancied resemblance to *magnesia alba*. Manganese is of a grayish colour, and finely granular texture; softer than cast iron; very brittle; of different fusibility; and when exposed to the air, it gradually oxidates and crumbles into powder. There are few subjects of greater difficulty among chymists than the determination of the number of oxides which this metal produces, and until the number and determination of these metals shall be settled, the knowledge of the salts of manganese must remain in a state of great imperfection. Manganese has been united with iron, copper, tin, zinc, gold, and arsenic, but refuses to combine with silver, mercury, or lead.

The *protoxide* (MnO) constitutes the base of almost all the salts of manganese; the *sesquioxide* (Mn^2O^3) corresponds in its constitution with peroxide of iron; the *binoxide* (MnO^2) is the most important of all the ores of manganese, from the property which it has of giving out oxygen when heated; and the *red oxide* (Mn^3O^4) is formed whenever any oxide of manganese is strongly heated in an open vessel.

There is an ore of manganese found in Warwickshire, to which the name of *varvicite* has been given. It is black, has the metallic lustre, a foliated texture, and is very soft.

The common black oxide of manganese is of great service to the chymist for procuring oxygen; it materially assists the glass manufacturer in depriving glass of the green colour, which the iron present in the sand, or the flux, is liable to give to it; and it is largely employed in the preparation of chloride of lime for the bleachers.

Iron (symbol Fe (*ferrum*), equivalent 28) has been known from the remotest antiquity, and is diffused so universally in the earth that there are few mineral substances in which its pressure may not be detected. Native iron occurs exceedingly rarely, though it accompanies the Uralian platinum, and is observed in a thin layer, two inches thick, in chlorite slate, near Canaan, in the United States.

It need scarcely be said that iron is of great use in the arts and manufactures. The beautiful pigment known by the name of Prussian blue is a precipitate afforded by sulphate of iron. Vegetable astringent matters, such as nutgalls, the husks of nuts, logwood, teas, &c., which contain the gallic acid, precipitate a fine black fecula from sulphate of iron, which remains suspended for a considerable time in the fluid, by the addition of gum arabic. This fluid is well known by the name of ink. Chromate of iron forms a beautiful green for enamelling or colouring pastes. If the purest malleable iron be bedded in pounded charcoal, in a covered crucible, and kept for a certain number of hours in a strong red heat, it is found that, by this operation, which is called cementation, the iron has gained a small addition of weight, amounting to about the 150th or the 200th part, and is remarkably changed in its properties. This cemented iron is called steel.

The *blueing* of steel appears to affect its elasticity in a manner not easily explained. This operation consists in exposing steel, the surface of which has been first brightened, to the regulated heat of a plate of metal, or a charcoal fire, or the flame of a lamp, till the surface has acquired a blue colour. Now, if this blue coal be removed by grinding, the elasticity is completely destroyed, and may be restored by blueing the steel again. Rubbing with sand or emery-paper, glazing, or burnishing, equally impairs the elasticity in proportion as it destroys the blue coat. Sawmakers first harden their plates in the usual way, in which state they are brittle and warped; they then soften them by *blazing*, which consists in smearing the plate with oil or grease, and heating it till thick vapours are emitted, and burn off with a blaze; and after this they may be hammered flat. Lastly, they blue them on a hot iron, which renders them stiff and elastic without altering their flatness. The Damascus sword-blades have long been celebrated for their excellence, but it is not known how they are made. Mr. Stoddart took six small bars of good malleable iron, and the same number of sheer steel; laid them alternately on each other; welded them together; forged them into a stout flat plate, which was twisted spirally into a cylinder, hammered flat, and again welded; hammered this flat, doubled throughout its length, inserted in the fold a slip of good steel to form the edge, and by another welding heat consolidated the whole into one mass. This being forged to a proper shape, cracked in different places on being cooled in water after heating; but Mr. Stoddart conceived, that by using more pieces, repeating the twisting, and not quenching in water, the process would succeed.

Iron is very liable to be oxided, or contract rust. Conté informs us, that if fat oil varnish be mixed with half, or at most four-fifths of its weight of oil of turpentine, and this be applied lightly and evenly with a sponge to iron or steel, and left to dry where it is not exposed to dust, the metal will retain its lustre, without any danger of rusting. In order to prevent gun-barrels from rusting, they are frequently browned. This is done by rubbing the barrel over when finished with aqua fortis, or spirit of salt diluted with water, and laying it

by for a week or two, till a complete coat of rust is formed. A little oil is then applied, and the surface, being rubbed dry, is polished by means of a hard brush and a little beeswax. The yellow spots called iron moulds, which are frequently occasioned by washing ink spots with soap, may in general be removed by lemon-juice, or the oxalic or tartarous acids, or by muriatic acid diluted with five or six parts of water; but this must be washed off in a minute or two. Ink-spots may readily be removed by the same means. If the iron-mould have remained so long, that the iron is very highly oxided, so as to be insoluble in the acid, a solution of an alkaline sulphuret may be applied, and after this has been well washed off, the acid will remove the stain.

Zinc (symbol Zn, equivalent 32·579) is a metal of a bluish white colour, somewhat lighter than lead, hard and malleable, though not easily reduced into small parts by filing or hammering. In its native state it is very seldom found. The oxidised ores of zinc are, zinc spar, of a whitish gray colour, and calamine, of a white, gray, yellow, brown, or red colour. The ore called *blende mock lead*, or *black jack*, of which there are several varieties found plentifully in the mine counties of England, consists of zinc mineralised with sulphur and iron. The chief purpose to which zinc is applied consists in the fabrication of brass and other gold-coloured mixtures. Its oxides and salts are occasionally employed in medicine. The substance formed from it, named *spelter*, is used by the braziers and others for soldering.

Tin (symbol Sn, equivalent 58·918). The specific gravity of tin is less than that of any other malleable metal. It is of a yellowish white colour, harder than lead, scarcely at all sonorous, and very malleable. It is scarcely ever found native, and is not very much diffused. It is found in Bohemia, Saxony, Malacca, and the East Indies, though the greatest quantities are found in England, particularly in the county of Cornwall. The calciform ores of tin are: wood-tin, hitherto found only in Cornwall and Mexico, in fragments generally rounded, of a brown colour, specific gravity from 6·450 to 6·738, 0·91 oxide of tin, 0·09 oxide of iron; tin spar, which is generally of a whitish or gray colour, sometimes greenish or yellowish, semi-transparent, and crystallised in a pyramidical form, or irregularly; opaque brown or black tin ore, crystallised and embodied in quartz, fluor, or mica, or mixed with white and yellow pyrites; these ores contain a mixture of iron; the reddish yellow, or garnet ore, which contains more of iron than tin; and the tin-stones, vulgarly called loadstones, which contain still less tin. The uses of tin are very numerous and well known. It is one of the principal additions used in making pewter. As tin-foil, that is, hammered into very thin leaves, about 1000th of an inch thick, or less than half that thickness, it is required much for the purposes of trade. The tinning of iron and copper; the silvering of looking-glasses; and the fabrication of a great variety of vessels and utensils for domestic and other uses, are among the advantages derived from this metal. The combination of oxide of tin and sulphur forms a compound called *aurum musivum*, which is used as a pigment for giving a golden colour to small statue or plastic figures, and is likewise mixed with melted glass to imitate lapis lazuli.

Cobalt (symbol Co, equivalent 29·539) is a metal of a whitish gray or steel colour, hard and brittle, of a dull, close-grained fracture, of moderate specific gravity, rather more difficult of fusion than copper, and not easily becoming calcined. It is found in several parts of Europe, and in Cornwall. Its use is confined chiefly to the production of the blue glass for enamels and other purposes. The powder "blue," and a bad sort of stone blue, used by laundresses, is a preparation made by the Dutch from the coarse smalt.

Cadmium (symbol Cd, equivalent 55·831). The cadmium of the furnaces is matter that sublimes when ores containing zinc are smelted. This consists of the flowers of zinc, which rise by the violent heat of combustion, and adhere to the inside of the walls of the furnace; which, being hot, do not condense them immediately into the solid state, but cause them to pass through a state of fluidity intermediate between the elastic and the solid state. On this account they have a much less interrupted solidity than the flowers of zinc usually possess. The name of cadmium has also been given to other sublimates that rise in the smelting of ores. Calamine, or lapis calaminaris, which is an ore of zinc, has also been called native cadmium. This, as well as the cadmium of the furnaces, is used in the converting copper into brass. The ore of cobalt is sometimes, but very improperly, called fossil cadmium.

(To be continued.)

Technicologia.

204. *Common Transparent Paper.—a.*—Mix together equal parts of olive oil and turpentine, to which add a little sugar of lead, and rub this mixture upon tissue paper. This is very tedious in drying, and remains for a long period.

b.—Lay over the tissue paper a thin coat of copal varnish, or mastic varnish. This makes a clear, good paper, but it will not bear ink or water-colour. In the latter respect paper washed over with spirit varnish is superior.

205. *Best Transparent Paper.*—Mix together by a gentle heat, one ounce of Canada balsam, and a quarter of a pint of spirits of turpentine; wash it as before, over one side of tissue paper. This dries quickly, is perfectly transparent, and is not greasy, therefore does not stain the object upon which it may be placed.

206. *Transparent Guide Paper for Oriental Tinting.*—Use the mixture of Canada balsam and turpentine, as above, on both sides of a sheet of thick drawing paper; it will become beautifully transparent. It takes some days in drying, and, when new, sticks somewhat to the fingers.

[Ink and water-colours, when to be used upon any kind of transparent oiled paper, must have a very small quantity of *gall* mixed with them, which will flow readily upon the greasy surface. Transparent papers are sold at extravagant prices, notwithstanding the vast consumption there is for them. The architect draws chiefly upon them the numerous designs requisite in his profession. The engraver is by their use enabled to transfer to the wood-block or to the metallic plate an accurate design, and at once to reverse it by merely turning over the paper; the artist, with this transparent copy, can make any number of objects similar in attitude, in size, and in detail, and all can procure fac-similes of patterns, of prints, of autographs, and every object of artistical decoration and interest, by merely laying the tracing paper above the subject to be copied, and drawing with a pencil whatever is seen beneath. It is sometimes requisite to transfer a delineation from transparent paper on to another and less flimsy material, for example, an

elaborate architectural plan, when first formed, must of necessity have upon it numerous false lines, marks of the points of the dividers, &c., which, in the finished plan, would be unsightly; to remedy this it is drawn first on common paper, and then transferred to a thicker and cleaner sheet. This process involves the use of the opaque tracing papers; these are of such a nature that when the prepared side is placed downwards, and anything is written with a point upon the back, a part of the composition comes off, and leaves a black mark on a piece of paper placed beneath, exactly similar to what may have been written above. Upon this principle the *manifold writers* are made; first is laid a sheet of common paper, upon this a sheet of prepared paper, face downwards, then another piece of common paper, then prepared paper again. This may be repeated three or four times, if the papers be thin, and upon drawing or writing anything upon the upper sheet, you will have several exactly-similar copies below. Plans and patterns are often drawn in this manner.]

207. *Black Lead Paper.*—Nothing more is necessary than to paint over, with a brush, a sheet of thin writing paper, with black lead powder, mixed with water. When dry it will be fit for use. It gives lines sufficiently distinct for most purposes, and has the advantage that it may be rubbed out afterwards with Indian rubber when desirable.

208. *Soap Paper.*—Rub over one side of a piece of thin paper (using a piece of rag), a mixture of soap, lamp black, and a little water: when dry, wipe off as much as possible with a cloth, to prevent the paper staining the sheet to be placed beneath. It will be quite black, and the mark made by it cannot be obliterated by Indian rubber.

209. *Painter's Cream.*—Take six ounces of pale nut oil, one ounce of mastic—dissolve and add a quarter of an ounce of sugar of lead, previously ground in the least possible quantity of oil; then add water gradually until it acquires the consistence of cream, working it well all the time. Used by painters to cover their work when they are obliged to leave it some time. It may be washed off with a sponge and water.

210. *On the Use of Oxide of Zinc, or Zinc White, in Paintings.*—M. V. Dumas, President of the Academy of Arts and Sciences, of Dijon, claims for M. de Guyton Morveau, the discovery of the application of oxide of zinc to painting, as far back as the year 1782. The Royal Academy of Architecture, of Paris, appointed a commission in 1786, who made a favourable report on its employment. "We are indebted," said the commission, "to the zeal and enlightened views of M. de Guyton Morveau, for the numerous and repeated experiments which have been made on the zinc white. From these experiments it is evident that the zinc white possesses two most important advantages over white lead; the first is, that its use is not at all injurious to health; the second is, that it retains its freshness and whiteness without being, like white lead, affected by sulphurous vapours, and covers at least one-third more of surface." "The only thing," says M. Dumas, "which astonishes me is, that its application to the painting of apartments has not been continued and extended. This, in my opinion, has been owing to the high price of the metal, which has prevented the zinc white from entering into mercantile competition with white lead." As much attention has of late been called to this subject, the Academy of Dijon is prosecuting some experiments, the results of which is promised to be shortly communicated to the Academy.

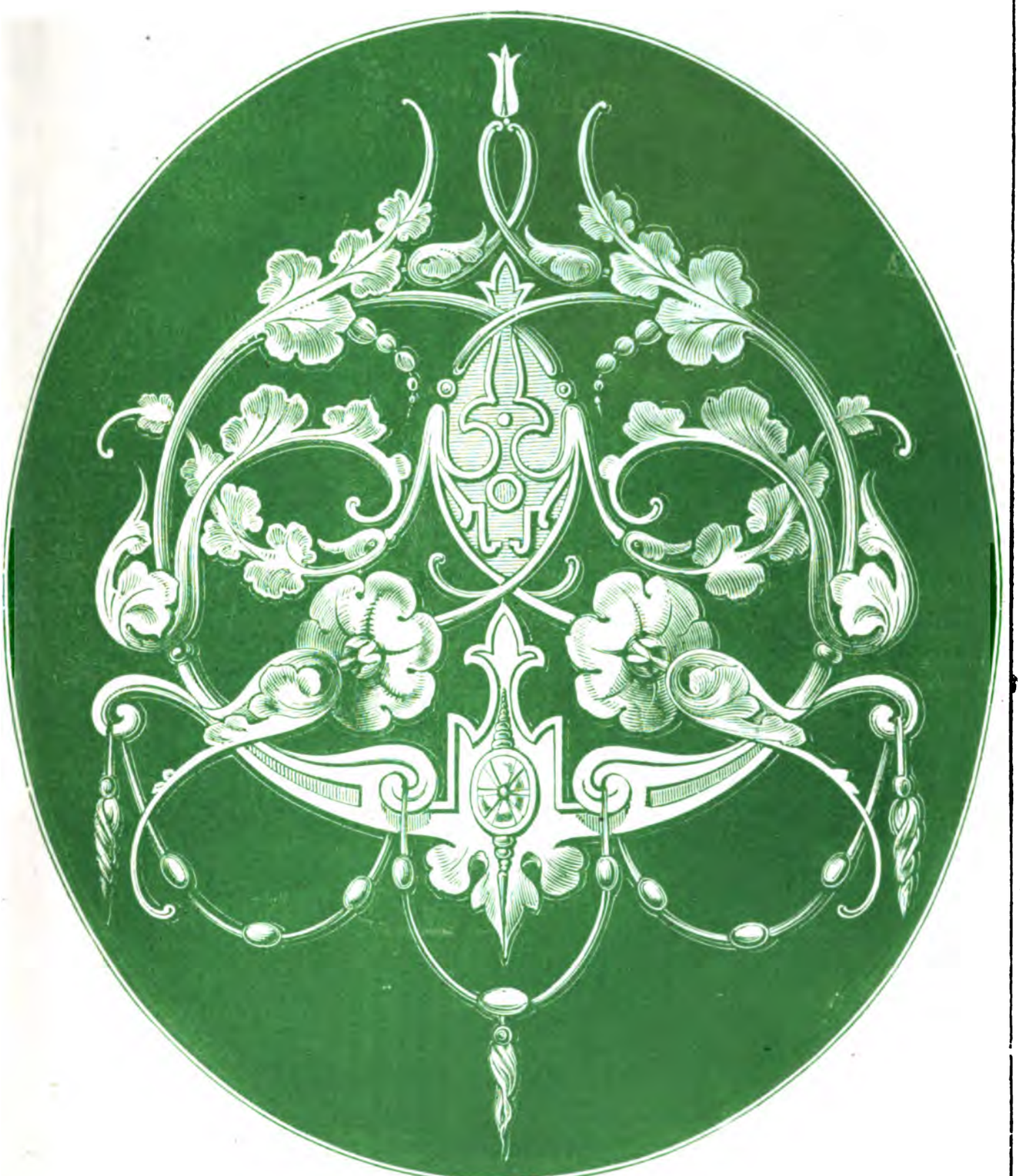
IRON FROM SCORIA.

It is said that a native of Germany has discovered a process by which iron may be extracted from the scoria, or dross from the furnaces, which is always thrown away as completely useless. It has hitherto been a matter of surprise that this material, which is known to contain a great quantity of iron, has not been treated in the same manner as the ore from which it is produced. Attempts have been made to reduce it into the metal, but with results not commensurate with the expense attending the operation, and great difficulties have always been experienced in prosecuting every plan yet suggested. These difficulties consist in its extreme infusibility, in the large quantity of sulphur and phosphorus contained in it, and principally in the closeness of its body, which prevents access to the reducing gases. In Silesia, where the ore is very poor and difficult of reduction, and yields iron of a bad quality, it is customary to add to it about one-tenth of scoria. In Scotland, in the large furnaces heated with anthracite coal, as much as 25 per cent. of scoria is frequently added to the ore; but it is only in furnaces of the greatest dimension (60 ft. high) that this quantity of scoria can be absorbed without impeding the progress of the smelting. The iron, besides, that is produced from this combination, is always of an inferior quality. The certain profit which would be sure to result from bringing this refuse into use, incited the German gentleman we have alluded to to make the attempt. He set to work with ardour, tried numerous experiments, and at last found his efforts crowned with success. His plan is said to be simple and inexpensive, and the metal, separated from the sulphur, phosphorus, and other ingredients, is described as of good quality, and abundant. The details of the plan are not made public, as the inventor is about to apply for a patent to secure himself its advantages.

CONVENTIONAL DETAIL OF SARACENIC ARCHITECTURE.

Every ornament, every pattern (and none are more intricate than those of Arabian mosaics and stone-work), seems the result of the deepest thought, yet the wildest fancy, restrained by the severest of rules. But, except in India, where such masses as those of the great mosque of Delhi attest the boldness of the designers there, we see little trace of the powerful minds which could raise high in the air the great dome of St. Paul's; or send towering up towards heaven, the grand outlines of Canterbury or Lincoln. And even in the ornamentation of the Arabians (and it *is* so graceful, so wildly luxuriant, yet so restrained, that we can hardly venture to carp at it), one great element of beauty is everywhere absent—nature. That law of their prophet, that the Creator's works were not for man to copy, shut out for ever from his followers this one chief source of beauty; and, save in a few instances, at Damascus and in Spain, there exists, in all the Arab works, no copy of created thing, living or inanimate. Deprived of such an aid as nature, their works speak to the eye only, not to the heart. The Arab architect dare decorate his work with no likeness of those whom his nation revered or loved. No cunning workman, as he carved the stone in Egypt or in Spain, dare grave upon it the flower or the leaf, or the animated form which might remind him of his native land; and thus to him was "beauty by one entrance quite shut out." Yet, let us do him justice, and admit that, with what light he had, and in his own chosen style, he worked with a grace and beauty never, perhaps, surpassed.

ALPHABET (THIRTEENTH CENTURY).



PANEL (RENAISSANCE)

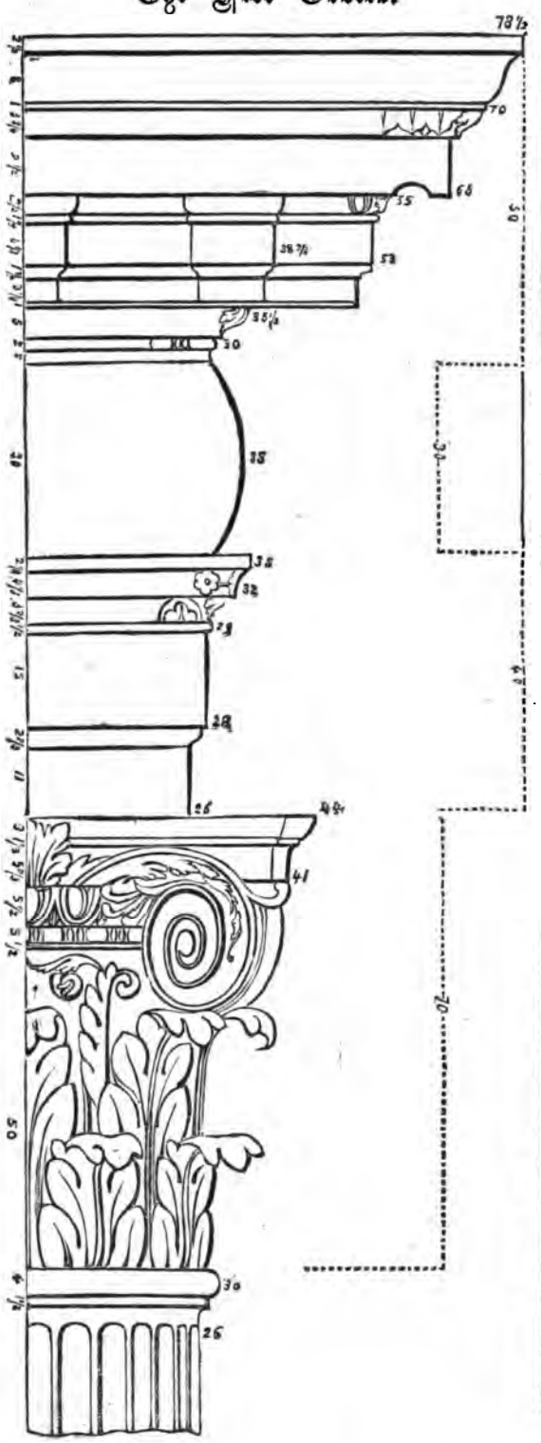
Ornamental Paperhanging.

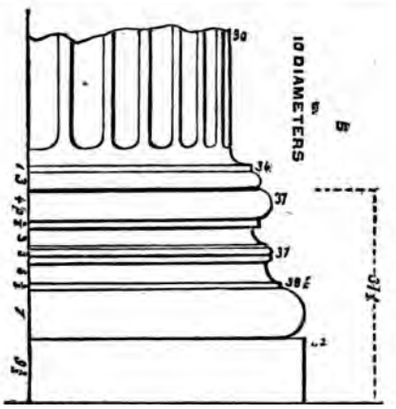
EVER since the removal of excise regulations, the progress of this important branch of decorative art has been very rapid. The application of machinery in the manufacture of paper-hangings, and the consequent reduction in price, have now brought these really useful and pleasing additions to household comfort within the reach of all. The quantity now manufactured in a single year is, to those unacquainted with the trade, almost incredible; still the demand is increasing, and, whilst the desire for novelty inherent in all classes exists, manufacturers who possess cultivated taste need be under little apprehension of the art being injured by over production. Artists of celebrity are now devoting their talents to every branch of ornamental decoration, and chymists of eminence are employed in all departments of manufactures. The elegance of the designs and the brilliancy of the colours of the ornamental paperhangings of the present day, show the advance the art has made since superior intelligence has been applied to it. The removal of the excise duty of one shilling per piece, which took place about twelve years ago, and the vast improvement in the manufacture of paper, it now being made in any lengths required, caused a complete revolution in the paperstaining trade—the difficulty of paying the duty hitherto preventing small manufacturers from carrying on the business. The public have also gained much by the destruction of the monopoly the great houses enjoyed whilst it continued. The recent alteration in the customs' tariff, by which French paperhangings formerly charged one shilling per square yard, are now charged only twopence duty, has brought our manufacturers into competition with very formidable antagonists, yet the resources and energy of our leading houses have so far overcome the difficulties caused by the change, that, notwithstanding the large importations of French papers, by adopting a different plan of production, they are enabled to compete in cheapness, and in the quality of the goods display an honourable emulation with their very talented rival. We are much indebted to our neighbours, whose exuberance of fancy in ornamental designs seems inexhaustible; and the skill exercised in selections and arrangements from French designs for patterns for paperhangings to suit the English taste is highly creditable to our artists. In giving a description of paperhangings, we shall commence with those of the cheaper sort; and here, unfortunately, for the progress of the art, the legislature has committed an error in retaining any part of the duty on foreign paperhangings—the twopence per square yard being a prohibition on all paper below a certain price, the actual amount of protection it gives to our manufacturers being about fourteen pence per piece, enables them to make much larger profits in proportion on the cheaper goods than on those in which they have to meet French competition—the trade, being compelled to pay every attention that the designs and the general effect of the higher priced goods should be on an equality with the French, having to contend only with the opposition among themselves in the cheap ones, are not so particular; the struggle is to produce the largest quantities at the lowest price; consequently, the market is glutted with comparative rubbish, which would not be the case if the twopence per square yard on foreign papers were remitted. As the designs on the cheap French papers are quite as elegant as those of the better sorts, our manufacturers would be obliged to imitate them instead of producing the very inferior class of goods now in use. It is lamentable that restrictions on art and commerce should principally affect those whose pecuniary means are least able to bear them, and in levying imposts, not for the purpose of revenue, but for the protection of particular interests; the axiom of the greatest happiness to the greatest number is too frequently lost sight of. The retaining a small duty on foreign paperhangings prevents the dwellings of the poor from being much improved, which they certainly would be by the free importation of all kinds; and however we may excel in the sterner realities of life, it must be admitted that the temperament of Southern Europe is much better adapted for the production of genius in ornamental design than ours, the free scope of which would tend much to elevate the tastes and sentiments of a considerable portion of our population. As national prejudices are fast yielding to the increasing necessities of society, it is to be hoped that all protective duties may be eventually abolished, and that tariffs founded on the reciprocity of mutual benefits be substituted. The result of the above reflections will show that, although we may obtain paperhangings at very low prices, we are still deprived of many advantages, that, under another system, we should enjoy. It will be unnecessary to enter into any detail of this department of the trade, further than to state that ornamental paperhangings may be purchased from about one farthing per yard.

MOTTOES ON OLD DOORWAYS.

In some of the ancient towns of England, but more generally in those of Scotland, you fall upon quaint and friendly mottoes which have been cut with various styles of ornament over the doorways of dwellings and other buildings, and lead one to regret that in these matter-of-fact times such a practice should have been abandoned. It would be thought out of harmony with the style of our modern houses and ideas to introduce the old practice. It is not that the old feeling has departed: at the present day, although the only ornament to be seen on a door is a lion-headed or some other knocker, in most instances the hospitality is the same as if some antique couplet were cunningly devised, expressive of welcome. Notwithstanding, there are some practices which we cannot but regret the departure of, and this is one of them. At the present day the old inscriptions below the armorial bearings of the London companies may be still met with; amongst them the "Honor Deo," of the Mercers; "God grant us Grace," of the Grocers; "All Worship be to God alone," of the Fishmongers; "To God only be all Glory," of the Skinners; "By Hammer and Hand all Arts do stand," of the Blacksmiths; "God is my Strength," of the Ironmongers. Such mottoes breathe a good spirit, and suggest useful thoughts. In Elizabethan and Jacobean buildings, it will be remembered, inscriptions over doorways are not uncommon.

The Five Orders.





COMPOSITE COLUMN (PALLADIO).

Grammar of Chymistry.

FOR THE USE OF ARTISTS AND ARTISANS.

CHAPTER X.—METALS WHICH ABSORB OXYGEN AT HIGH TEMPERATURES, AND DECOMPOSE WATER AT A RED HEAT.

Nickel (symbol N, equivalent 29·57). A mineral having the colour of copper, to which the German miners, having attempted in vain to extract copper from it, gave the name of *kupfer-nickel*, or false copper, was found by Cronstedt of Sweden in 1751, to contain a particular metal, which he called *nickel*. This metal is nearly as white as silver, but with a slight cast of yellow; is malleable and rather softer than iron. It possesses permanent magnetic properties, and is therefore much applied in the formation of magnetic needles. The alloy of nickel and iron is very serviceable in the arts, being less liable to rust than common iron, but nickel alloyed with steel increases the tendency to rusting. When it combines with gold, copper, tin, and arsenic, the alloys are brittle, but when with silver the alloy is as ductile as when it compounds with iron.

CHAPTER XI.—METALS WHICH DO NOT DECOMPOSE WATER AT ANY TEMPERATURE.

Arsenic (symbol As, equivalent 75). The word *arsenic* (ἀρσενικὸν), occurs first in the works of Dioscorides, and some authors who wrote about the beginning of the Christian era. It denotes in their works the same substance which Aristotle had called σανδαράκη, and his disciple Theophrastus ἀρρενικόν, a reddish coloured mineral, composed of arsenic and sulphur, used by the ancients in painting and in medicine. What is known in commerce as arsenic is the *white oxide of arsenic*, mentioned by Avicenna in the eleventh century, but at what period the metal called arsenic was first extracted from that oxide is unknown. Paracelsus seems to have known it; but it was only in the year 1733 that this metal was examined with chymical precision by

Brandt, who demonstrated its peculiar nature. It exists native in the state of an oxide, and as a constituent part of many metalliferous ores. It is brittle and soft; easily pulverised; readily fusible, and rises in vapour at about 356° Fahr. When thrown on a red hot iron, it burns with a blue flame and a white smoke, having a strong alliaceous odour. It combines to form alloy with all the other metals. In the form of its yellow sulphuret, it forms a pigment, being the colouring principle of *king's yellow*. Preparations of it are employed in medicine, and form the active ingredient in certain ague-drops. Its sulphurets are poisonous, but not to such an extent as the metal itself or its oxides. A decisive test of arsenic is a matter of great importance in medical jurisprudence, as upon it the life of an accused person must frequently depend. Several tests have been proposed for this purpose, but, as it would seem, all are more or less uncertain. And yet Dr. Christison, by certain chymical processes, was enabled to separate and exhibit so small a quantity as the twentieth of a grain from the stomachs of people who had been poisoned with arsenic.

Chromium (symbol Cr, equivalent 52), derives its name from χρωμα, *colour*, owing to its remarkable tendency to form coloured compounds. As obtained by the process of its discoverer, Vauquelin, it has a white colour with a shade of yellow, and a distinct metallic lustre. It is brittle, very infusible, and with difficulty attacked by acids, even by the nitro-hydrochloric. The mineral from which it is obtained, *chromium ore*, imported abundantly into this country from the bare hills of Baltimore, is employed in the manufacture of *bichromate of potash*, which is used by the calico printers as a yellow dye.

Vanadium (symbom V, equivalent 68·5) was discovered by Sefström in a Swedish iron remarkable for its ductility. It is the produce of the iron mine of Taberg, and exists also in an ore of lead which occurs at Zimapan, in Mexico. It is white, and resembles silver, it is not malleable and is easily reduced to powder in a mortar. It is a good conductor of electricity. It combines with three different proportions of oxygen and forms three compounds.

Molybdenum (symbol Mo, equivalent 47·7) has a silvery-white colour like the previous metal, and is procured from molybdena, a soft foliated mineral having the metallic lustre and similar in appearance to *black lead*. It is brittle, and is not altered though kept under water, nor is it liable to alteration from exposure to the air. It combines with three different proportions of oxygen, and forms three compounds. The salts of molybdemum have slightly poisonous qualities.

Columbium (symbol Ta, equivalent 18·5). This metal, called *tantalum*, by the Swedes, was discovered in a black mineral from America, now distinguished by the names of *tantalite* and *columbite*. It cannot be fused by the highest heat that can be raised in a wind furnace. Under the burnisher it assumes the metallic lustre, and has a yellowish-white colour. It combines with two proportions of oxygen, and is of no use in the arts. The same may be said of

Titanium (symbol Ti, equivalent 24·3), a metal of a copper-red colour and a great deal of brilliancy, which exists in titanite or red schorl, and has been found crystallized in small cubes in the slag of the hearth of various iron works, particularly Merthyr Tydvil, in Wales.

Uranium (symbol U, equivalent 60) is obtained chiefly from *pitch blende*, a black heavy mineral which occurs at Johan Georganstadt, in Saxony. It has an iron-gray colour of considerable lustre, and is soft enough to yield to the file. It combines with two proportions of oxygen, and forms two oxides, the green and the yellow.

Cerium (symbol Ce, equivalent 47·264) exists in a reddish-coloured mineral found in Sweden, named *cerite*, and is a gray powder, having the metallic lustre; but its peculiar properties have not yet been determined. Equally unknown are the properties and compounds of the new metals *lantanium*, *didymium*, *erbium*, *terbium*, *norium*, *niobium*, *pelopium*, and *ilmenium*.

Tellurium (symbol Te, equivalent 64·2) occurs in the metallic state, chiefly in combination with gold, silver, and bismuth. It has a tin-white colour running into lead gray, a strong metallic lustre and lamellated texture. It is very brittle, and fuses at a temperature below redness. Its compounds are seven in number.

Tungsten (symbol W, equivalent 99·7) derives its name from the Swedish words *tung sten*, *heavy stone*, from the density of its ores; and it is called *wolfram*, from the mineral of that name. It has a grayish-white colour and considerable lustre, is brittle, nearly as hard as steel, and less fusible than manganese. Chymists are acquainted with two compounds of this metal and oxygen, namely, the *dark brown oxide*, and the *yellow acid of tungsten*.

Antimony (symbol S (*stibium*), equivalent 64·67) was first made known in the fifteen century, and is said to derive its name (*anti-moine*, *anti*-monk) from having proved fatal to some monks to whom it was given as a medicine. It sometimes occurs native; but its only ore (from which the antimony of commerce is derived) is the sulphuret. It is a brittle metal of a white colour running into bluish-gray, and possessed of considerable lustre. It is an ingredient of various alloys, the most valuable of which is type metal. Its *teroxide* is the base of the medicinal preparation *tartar emetic*. On account of its most active and best known preparations being violently emetic, antimony is rarely a poison, as it counteracts its effects. Another metal of this class affording some poisonous salts is

Bismuth (symbol B, equivalent 2·13). It is a reddish-white colour and is composed of broad plates adhering to each other. It is rather softer than copper, is not very brittle and is not malleable. What of this metal exists in commerce is procured by simply melting out its gangue, by exposing it to a moderate heat in contact with burning fuel.

Copper (symbol Cu (*cuprum*), equivalent 31·699). One of the most abundant and well-known of the metals, of which many ores exist. Hammering almost doubles its tenacity, for while a bar of cast copper a quarter of an inch thick requires 1192 lbs. to break it, a bar of hammered copper of the same diameter requires 2112 lbs. to break it. The most important of all the alloys of copper is brass, which is a combination of that metal and zinc. What is called old Dutch brass, is a compound of four atoms copper and one atom zinc. Bronze and the metal of cannon are composed of from eight to twelve parts of tin combined with a hundred parts of copper. Bell metal is usually composed of three parts of copper and one part of tin. The alloys for the mirrors of telescopes consist of about two parts of copper united to one part of tin. Vessels of copper, when used as kitchen utensils are usually covered with a thin coat of tin to prevent the copper from being oxidised and to prevent the food which is prepared in them from being mixed with any of that poisonous metal. There is an alloy of copper and nickel manufactured which has a white colour like

silver, and is used for a variety of ornamental purposes.

Lead (symbol Pb, equivalent 103·738) is another of the most abundant and useful metals. The lead of commerce is extracted from the native sulphuret, the *galena* of mineralogists, and its uses are most extensive. It is used in making pipes for conveying water; also in making boilers and various vessels; and in covering buildings. Its oxides are used as paints. They are also employed in the manufacture of the finer kinds of glass, to which they communicate density, a higher refractive power, a greater equality of texture, and a greater susceptibility of polish. Hence, they enter into the composition of the pastes which imitate gems, and they form, in combination with other matter, the glazing of the inferior kinds of earthenware. The salts of lead have a poisonous quality, and yet in consequence of their sweet taste, they have at times been employed to correct the flavour of bad wines—an adulteration, which, it need scarcely be said, is most pernicious. Lead is also a valuable article in pharmacy

(*To be continued.*)

Technicologia.

211. *Sealing Wax.*—Red wax is made by carefully fusing together forty-eight parts of shellac, nineteen of Venice turpentine, one of Peru balsam, and thirty-two of fine cinnabar. Black wax is coloured with lamp-black; yellow, with a chromate of lead; blue, with smalt; green, with carbonate of copper.

212. *To Bronze with Oil Colour.*—First give the work a coat of white or red lead ground in oil, and when this is perfectly dry, apply another coat consisting of the colours before named ground in oil and mixed with a small quantity of japan varnish; this is to be suffered to dry until it becomes tackey, when a bronze powder is to be applied to it.

213. *To take Plaster Casts of Foliage.*—Mr. Deeble recommends the following process:—Lay the leaf as soon as convenient after gathering, upon fine grained moist sand, in a perfectly natural position—having that surface uppermost which is to form the cast, banking it up with sand in order that it may be perfectly supported. Then by means of a broad camel hair brush covered over with a thin coating of wax and Burgundy pitch rendered fluid by heat, carefully brush it over. The leaf must now be removed from the sand and dipped in cold water, when the wax becomes hard and sufficiently tough to allow of the leaf being ripped off without altering its form. This being done the wax mould is to be placed on moist sand and banked up as the leaf itself was. It must then be covered with plaster of Paris, made thin, care being taken that the plaster is accurately forced into all the interstices by means of a camel hair brush. As soon as the plaster is set, the warmth thus produced will soften the wax, which, in consequence of the moisture, is prevented from adhering thereto; and with a little dexterity it may be rolled up and parted completely from the cast without sustaining the least injury. Casts thus obtained are very perfect, have a high relief, and are excellent models either for the draughtsman or the moulder of architectural ornaments.

214. *Green Bronze Liquids.*—Take one quart of strong vinegar, half an ounce of mineral green, half an ounce of raw umber, half an ounce of sal ammoniac, half an ounce of gum arabic, two ounces of French berries, half an ounce of copperas, and about three ounces of green oats, if these can be procured, although if they cannot, the preparation will succeed perfectly well without them. Dissolve the whole in a strong earthen vessel, adding the berries and the oats, over a gentle fire; bring the compound to boil, then allow it to cool, and filter it through a flannel bag, when the bronze will be fit for use.

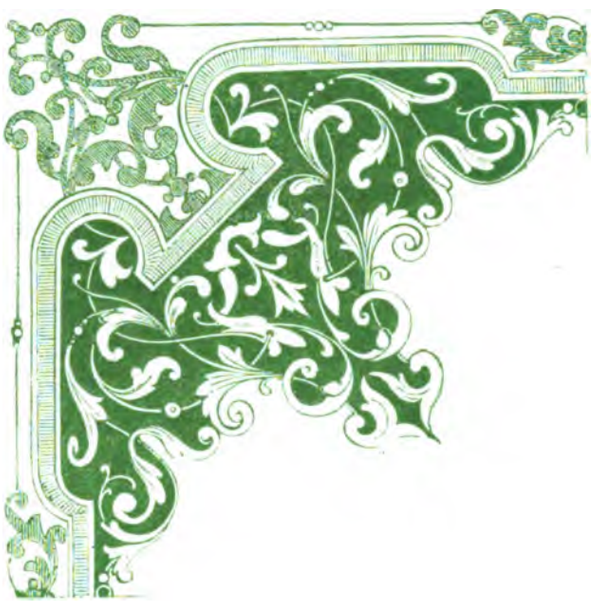
215. *To Remove Ink, Oil, and Grease Stains from Books, &c.*—Oxymuriatic acid removes, perfectly, stains of ink; and, should the paper require bleaching, the operation will answer both ends at the same time. Nearly all the acids remove spots of ink from paper; but it is important to employ such as do not attack its texture. Spirits of salt, diluted in five or six times the quantity of water, may be applied with success upon the spot, and, after a minute or two, washing it off with clean water. A solution of oxalic acid, citric acid, and tartaric acid is attended with the least risk, and may be applied upon the paper and plates without fear of damage. These acids taking out writing ink, and not touching the printing, can be used for restoring books where the margins have been written upon, without attacking the text.

216. *Damp Walls.*—When damp walls proceed from deliquescence in the case of muriate of soda, &c., in intimate combination with the sand used for the mortar, it is merely necessary to wash the wall with a strong solution of alum. This converts the deliquescent salt into an efflorescent one, and the cure is complete; or alum may be added to the plaster in the first instance.

217. *To remove Stains from Mahogany.*—Stains may be taken out of mahogany by spirits of salt (muriatic acid).

218. *To Break Glass in any Required Direction.*—Dip a piece of worsted thread into spirits of turpentine; wrap it round the glass in the direction you require it to be broken; then set fire to the thread, or apply a red-hot wire, a quarter of an inch thick, round the glass, and if it does not immediately crack, throw cold water upon it while the wire remains hot.

219. *Metallic Sand.*—This sand is produced by grinding copper slag by means of powerful machinery, and consists of iron, zinc, arsenic, and silica, the iron predominating; the slag is procured in abundance in Swansea. In chymical analysis, it is very similar to the pozzolano, and in point of durability is found to be equal to the latter. With blue lias lime, which is used for hydraulic works, the metallic sand readily enters into combination; and these having been used together for external works, exposed to all the changes of the atmosphere, have proved the indurating qualities of the metallic sand after an experience of eight years. Specimens were laid on the table:—1st, brickwork of a fresh-water tank, which had been erected six years, was removed by a pickaxe, the bricks yielding to the strokes of the axe, but the cement remaining solid; 2d, imitations of marble executed by a painter on the face of stuccoed work, formed of metallic cement, in conjunction with common chalk, lime, and putty, and afterwards polished; 3d, a specimen of fresco painting also executed on a face similar to the above; 4th, a vase, the figures on which retain their original sharpness, although it has been exposed to the atmosphere for many years.



CORNERS (ARABESQUE AND FRENCH).

Columns and their Measures.

THE columns of all the orders are constructed upon nearly the same principles, and are all divided into three primary parts or divisions, namely, the *base*, the *shaft*, and the *capital*, excepting the Doric order, which has no base. The lowest or thickest part of the shaft is used by architects as the universal scale or standard whence all the measures which regulate and determine heights and projections are taken; and this scale or standard must be understood before any architectural design can be commenced.

The universal architectural scale *is*, and is *called*, a diameter, being the diameter of the lowest or largest part of the column, and, unlike the foot, inch, or yard, is as various as are the diameters of the several columns. The diameter, of course, implies the chord of the circle, which forms the bottom of the column. Half of this diameter, or the length of the radius which forms the circle, is called a *module*, and is used as well as the *diameter* as a primary standard of mensuration by some writers upon architecture. These measures of length are subdivided as follows:—

Diameter . . .	60 parts
Module . . .	30 ,,

each part being the same in length, and denominated a *minute*.

Both mensurations are the same, only under different denominations; as, for instance, one author says, a column, which always includes the base, shaft, and capital, is six diameters twelve minutes high, while another would say of the same column and its admeasurements, that it is twelve modules and twelve minutes, both meaning the self-same admeasurements.

The column being the principal figure, it is essentially necessary that it be perfect in its proportions, according to the rules handed down to us by the ancients, which teach us that the height of the column should be measured by its diameter without a remainder, according to the different proportions of each order, of which, as we have before remarked, there are five—none exceeding ten nor less than seven diameters in height. Those of eight and ten are accounted perfect, the rest are inferior. The proportions of the five orders are as follow, including base and capital.—

Name.	Height.
Tuscan . . .	7 diameters.
Doric	8 ,,
Ionic	9 ,,
Corinthian . . .	10 ,,
Roman, or Composite .	10 ,,

Of Entablatures.—The entablature is the horizontal part of an order that is supported by the column, and consists of the *cornice*, *frieze*, and *architrave*, which differ essentially in all the orders. The cornice forms the upper division.

The Corinthian cornice is richest and loftiest in proportion—the fullest of members and enrichments of all the orders. It is known by its graceful proportions, its modillions, dentals, and sculptured members.

The Ionic cornice is of graver proportions, has no modillions, and very seldom, in the best examples, dentals, which had better always be left to the rich and gay Corinthian. Harmony of proportion, beauty of profile, particularly in the cymatium; breadth of parts, especially in the corona, are the leading features which characterize this order.

The Doric cornice is lower in its proportions than either of the others; has a greater comparative projection, and is known by the masculine character of its cymatium, which is always, in the purest examples, a beautiful echinus; by its mutules and drops, one of which is over every triglyph and metope of the frieze.

The frieze forms the middle compartment or division of the entablature. The frieze is the best situation in an entablature for sculptures and inscriptions, and many of the finest of the ancient temples, have had their friezes superbly decorated. The splendid metopes of the Elgin marbles were ornaments of the frieze of the Parthenon, and the Phigaleian marbles of the Temple of Apollo Epicureios, at Phigaleia. The frieze of the Temple of Jupiter Olympius, at Elis, bore sculptural representations of the chariot-race of Pelops and Œnomatis. Bucklers of gold, which were part of the spoil after the battle of Marathon, were suspended, according to Pausanias, in the frieze of the Temple of Apollo, at Delphos, which gave rise to sculptural imitations of them in many metopes of the Doric frieze. Among the most celebrated friezes of modern times, that of the Royal Exchange at London deserves at least a passing notice.

The architrave is the chief or principal beam in a building, lying horizontally on the summit of the column, and forming the sustaining portion of the entablature. The form and number of the mouldings, faces, and members of which an architrave is composed, varies according to the character of the order to which it is to be applied. In the Tuscan order it is a plain surface, surmounted by a fillet; in the Doric order it has sometimes two faces; in the Ionic and Corinthian it has sometimes two, and at others three faces; and in the Composite always three.

Having set forth a rule for the proportions of columns, we must now state that the entablatures must bear a proportion to them in each order. On this point Palladio has given a rule which cannot be subjected to any considerable alteration without the just proportions of the columns be altered, and, consequently, spoiled. He makes the entablatures of the Tuscan and Doric to be to their columns one to four; and the Ionic, Corinthian, and Composite, as one to five. The proportions of the entablature in each order is explained as follows:

Tuscan.—One and three-fourths of the diameter, which is one-fourth of seven diameters.

Doric.—Two diameters, which is one-fourth of eight diameters.

Ionic.—One and four-fifths of the diameter, which is one-fifth of nine diameters.

Corinthian.—Two diameters, which is one-fifth of ten diameters.

Composite.—The same as the preceding.

Of Pedestals.—The pedestal is a solid body of a round or square form, serving to support the column, and is divided into three parts, namely, the *base*, the *die*, and the *cornice*. No particular proportions can be laid down for the pedestal, but it is usual to allow it one-fourth or one-third of the height of the column, including the entablature; and this being divided into nine parts, two are for the base, one for the cornice, and six for the die, which latter is of similar dimensions with the plinth of the column. Pedestals vary both in their shape and ornaments, according to the order of architecture which surmounts them.

Grammar of Chymistry.

FOR THE USE OF ARTISTS AND ARTISANS.

CHAPTER XII. AND LAST.—METALS WHICH PART WITH OXYGEN AT HIGH TEMPERATURES.

Mercury (symbol Hg; equivalent 100·026) is distinguished from all other metals by its extreme fusibility, which is such that it does not take the solid state until cooled to the 39th degree below zero on Fahrenheit's thermometer. Its colour is white, and rather bluer than silver. In the solid state it is malleable. It is volatile, rising in small portions at the common temperature of the atmosphere. From this volatility it is commonly purified by distillation. It is not perceptibly altered by pure exposure to the air; it is disposed to attract moisture, and when it is agitated in a dry glass bottle, the friction produces electricity. Mercury is found native in slaty or quartzose earths, or visibly diffused through masses of clay or stone. Most of the mercury in commerce is afforded by the mines of Idria in the Austrian dominions, Almaden in Spain, and Guancavellica in Peru. The principal uses to which this metal is applied are the amalgamation of the noble metals, water-gilding, the making of vermilion, the silvering of looking glasses, the making of barometers and thermometers, and the preparation of several powerful medicines.

Gold (symbol Au, equivalent 196·982) is a yellow metal, of much greater specific gravity than any other body in nature, except platinum. It is soft, very tough, ductile and malleable; unalterable and fixed, whether exposed to the atmosphere or to the strongest heat of furnaces. Its tenacity exceeds that of any other metal, a gold wire of one-tenth of an inch in diameter requiring 500 pounds weight to break it. One grain of the best wrought gold-leaf will cover very nearly 57 square inches, the leaf itself being no more than $\frac{1}{282000}$th part of an inch thick. This, however, is not the limit of the malleability of gold; for gold-beaters find it necessary to add from 3 to 12 grains of copper in the ounce to harden the gold. The wire used by lacemakers is drawn from an ingot of silver, previously gilded, the covering of gold being only $\frac{1}{12}$th part of the thickness of gold-leaf, and yet so perfect as to exhibit no cracks when viewed by a microscope. Gold made standard by platinum, and hammered, is tolerably elastic. When united with mercury, the amalgam is softer the larger the proportion of mercury. Lead unites with gold, and considerably impairs its ductility. Copper renders gold less ductile, harder, more fusible, and of a deeper colour. This is the usual addition in coins and other articles used in society. Tin renders it brittle. With iron it forms a gray mixture, which obeys the magnet. This metal is very hard, and is much superior to steel for the fabrication of cutting instruments. Bismuth renders gold white and brittle; as do likewise nickel, manganese, arsenic, and antimony. Zinc produces the same effect; and when equal in weight to the gold, a metal of a fine grain is produced, which is well adapted to form the mirrors of reflecting telescopes, on account of the fine polish it is susceptible of, and its not being subject to tarnish. Gold is found mostly in the metallic state, sometimes alloyed with copper, silver, iron, or all three, sometimes in separate lumps or visible grains, in primitive rocks or among the sands of rivers. The greatest quantity of gold imported into Europe previous to the discovery of the vast fields in California and Australia, used to be from South America. Some is brought from the East India islands and China, and some from the coast of Africa. The principal gold mines of Europe are those of Hungary. Gold is also found in certain martial pyrites in Sweden. The principal use of gold is as the medium of exchange in coin, for which it has been chosen to occupy the first place, on account of its scarcity, its great weight, and its not being subject to tarnish. The gold coins in England contain eleven parts of gold, and one of copper. Gold is likewise used in gilding. The other uses of gold in laces, &c. are sufficiently known.

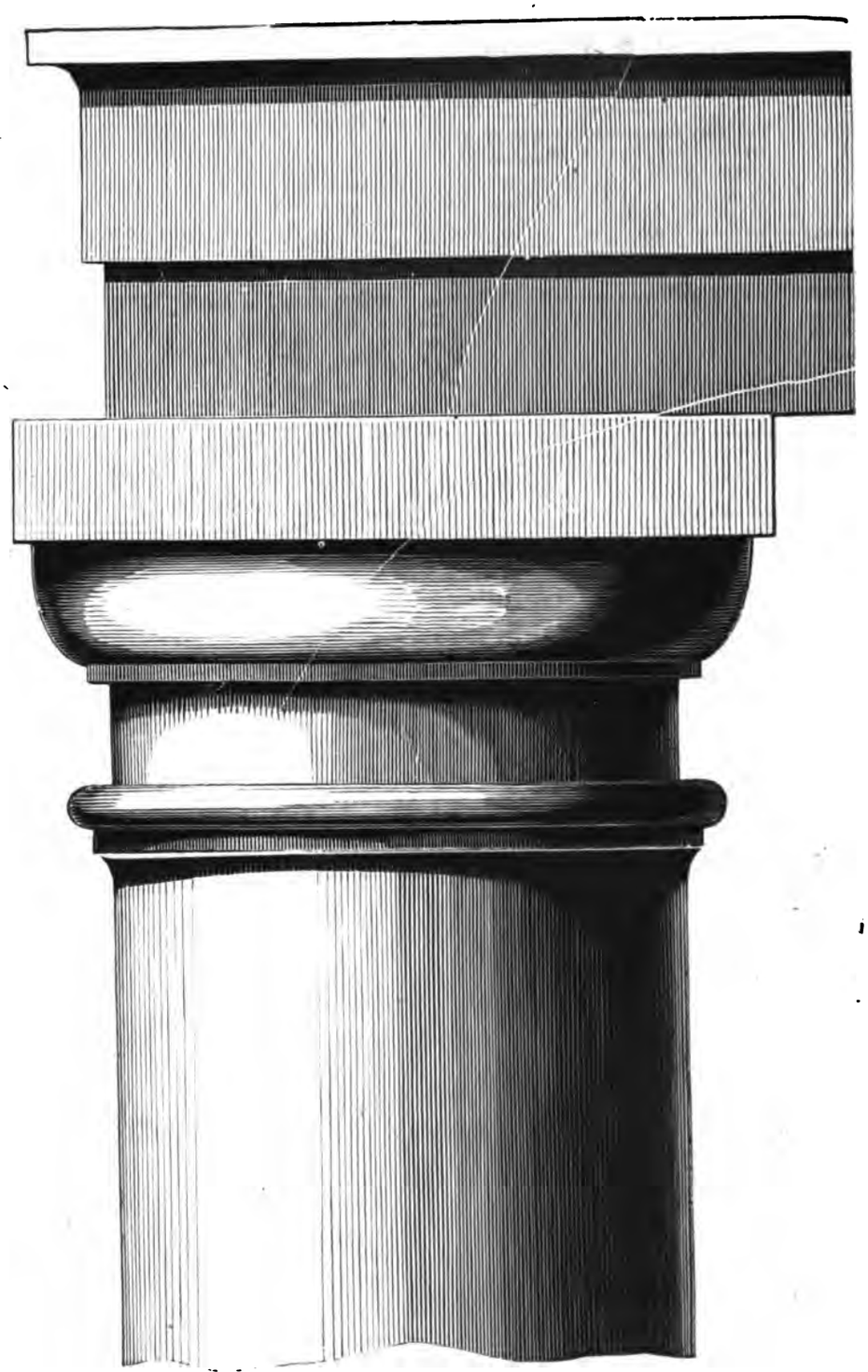
Silver (symbol Ag, equivalent 108·146) is the whitest of all the metals, considerably harder than gold, very ductile and malleable, but less malleable than gold. It is found either native or mineralized. The native silver is found in Peru, and various parts of Europe; sometimes in considerable masses and often diffused through sand, ochre, or limestone. It is seldom pure, but is generally alloyed with copper, and sometimes with gold, iron, or antimony The uses of silver are well known; it is chiefly applied to the forming of various utensils for domestic use, and as the medium of exchange in money. Its disposition to assume a black colour by tarnishing, and its softness, appears to be the chief objection to its use in the construction of graduated instruments for astronomical and other purposes, in which a good white metal would be a desirable acquisition. The nitrate of silver, besides its great use as a caustic, has been employed as a medicine with good success in epileptic cases and in cases of *angina pectoris*, having the effect of increasing the nervous power, by which muscular action is excited.

Platinum (symbol Pt, equivalent 98·724). For the discovery of this metal we are indebted to our countryman, Wood, the assay master of Jamaica, who brought a quantity with him from that island in 1741, though Ulloa appears to have mentioned it in 1735, and though it is said there are two ancient candlesticks in a cathedral in Germany apparently made of it before America was discovered. Certainly it is found, not only in Spanish America, among the gold mines there, but in Spain, in the mines of Guadalcanal, and in Russia, in the Ural mountains. It is found in the form of small particles, from the minutest size up to that of a pea, though the last are very seldom met with; and some pieces even as large as a pigeon's egg have been found. Its particles or grains are smooth, irregularly figured, with round edges, and are flattened, probably by hammering in the mills in which the gold is amalgamated. These grains are of a whiter colour than iron, and are considerably malleable. Pure platinum is by much the heaviest body in nature. It is not altered by exposure to air, neither is it acted upon by the most concentrated simple acids, even when boiling, or distilled from it.

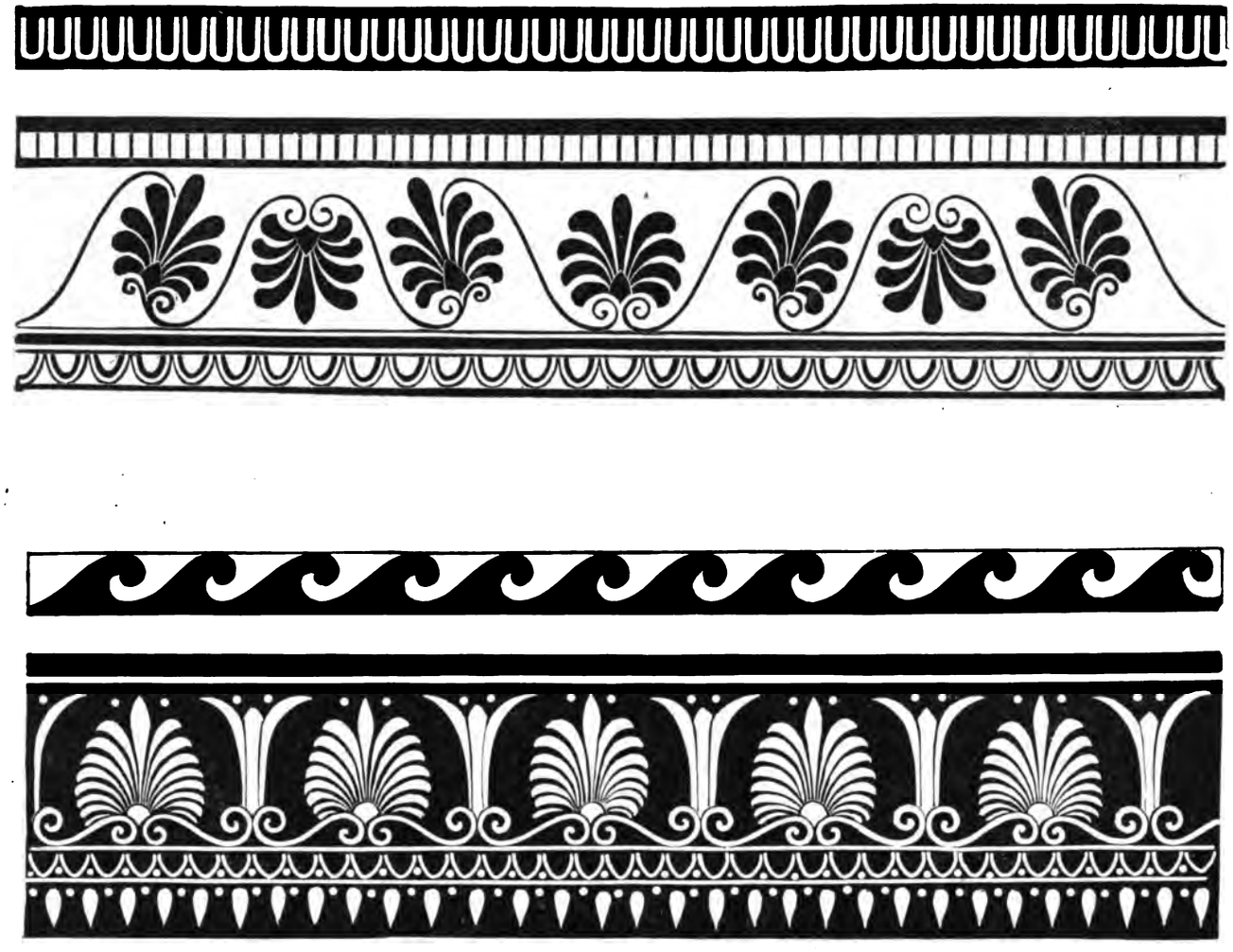
Palladium, *iridium*, *osmium*, *rhodium*, and *ruthenium*, are associated with it, all of them being metals found among the grains of crude platinum. The title of these products to be considered as distinct metals was long questioned, but the experiments of chymists have established them as belonging to the metallic elementary bodies.

THE END.

CORRESPONDENCE.—"J. Ollis" (Birmingham).—We have received your designs, all of which we consider very tasteful. We have already used one, and will use the others as circumstances permit. We will bear in mind the latter portion of your letter, and endeavour, if an opportunity should occur, to carry out your views.

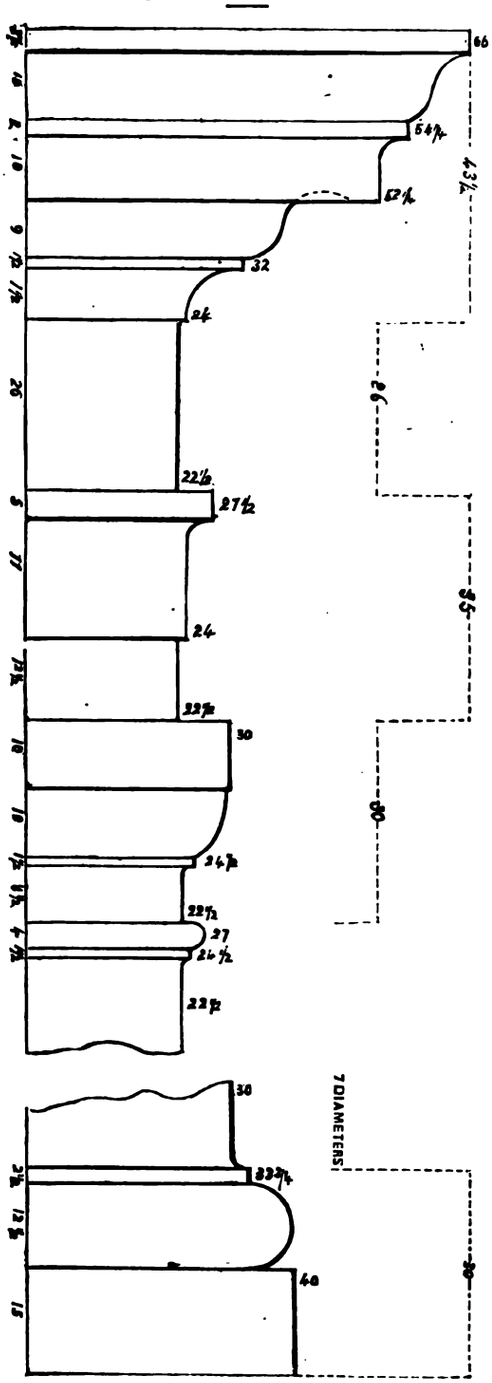


TUSCAN CAPITAL.



BORDERS (ETRUSCAN).

The Five Orders.



TUSCAN COLUMN (PALLADIO).

Architectural Glossary.

(Continued and concluded from page 72.)

SOCLE. A square member of less height than its horizontal dimension, serving to raise pedestals, or to support vases and other ornaments.

SOFFIT (or *sofite*). A ceiling; the lower surface of a vault or arch; the under horizontal face of the architrave between columns; the under surface of the corona of a cornice.

SPAN. The imaginary line across the opening of an arch or roof, by which its extent is estimated.

SPAN-ROOF is a roof consisting of two inclined sides, in contradistinction to a *shed* or *lean-to roof*, which consists of a single sloping surface.

SPANDRIL.—The irregular triangular space contained between the outer curve of an arch, and the rectangle enclosing it. *Spandril bracketing* is a cradling of brackets placed between curves; and a *spandril wall* is a wall built on the back of an arch.

SPIRE. A steeple diminishing as it ascends, pyramidally or conically; but in *ancient architecture* it signifies the base of a column, and sometimes the *astragal* or *torus*.

STANCHION. The upright mullions or bars of a window or open screen.

STRIDE. The lists or fillets between the flutes of columns.

STRIATED. Chamfered or channelled.

STRIGES. The channels of a fluted column. One channel is called *strix*.

SUB-PLINTH. A second and lower plinth placed under the principal one.

SUMMER. A lintel to a door, window, &c.; also synonymous with *girder*.

SURBASE. The series of mouldings immediately above the base of a room.

SYSTYLE. The manner of placing columns, where the place between the two shafts consists of two diameters or four modules.

TABLE (or *tablet*). A flat surface, generally charged with some ornamental figure.

TÆNIA. The fillet which separates the Doric frieze from the architrave.

TAMBOUR. The naked ground on which the leaves of the Corinthian and Composite capitals are placed.

TETRASTYLE. If the columns are four in number, the range is called *tetrastyle*.

TIGE. French term for the shaft of a column.

TORUS. A large moulding of semicircular section, used in the bases of columns. *Astragal* is the same but smaller.

TRABEATION. Another term for *entablature*.

TRACERY. The intersection of the mullions in the head of a window, the subdivisions of groined vaults, &c.

TRANSEPT. The transverse portion of a cruciform church.

TRANSOM. A beam across a window of two lights in height.

TRAVERSE. A gallery of communication in a church.

TREFOIL. Three cusps in a circle; an ornament in Gothic architecture.

TRIGLYPH. The vertical tablets in the Doric frieze chamfered on the two vertical edges, and having two channels in the middle.

TROCHILUS. An annular moulding of concave section,

the place of which is between the two *tori* of the base of a column; more commonly called a *scotia*.

TRUNCATED. The upper portion of a solid cut off. The part remaining is called a *frustum*.

TYMPANUM. The naked face of a pediment included between the level and raking mouldings.

TYPE. The canopy over a pulpit.

UNGULA. The segment of a circle which is part of the base and another plane, and the portion of a cylinder or cone comprised by part of the curved surface.

URILLA. The urillæ are the small volutes or twists branching out of the *caulicoli* under the *abacus* of the Corinthian capital—called also *helices*.

VERMICULATED. Rustic work so wrought as to have the appearance of having been eaten into by worms.

VIVO. Italian term for the shaft of a column.

VOLUTE. The spiral scroll forming the principal feature of the Ionic and Composite capitals.

WAGON-HEADED CEILING is the same as *cylindric ceiling*.

WREATHED COLUMNS are those which are twisted in the form of a screw.

ZIGZAG MOULDING. Ornament in Gothic architecture.

ZOCCO. Same as *socle*.

ZOTHECA indicates a small room separated from a room to which it is adjoined, or an alcove added to a room.

THE END.

Scene Painting.

This peculiar department of the art of painting, as contra-distinguished from all others, possesses its own laws, and its own practical and scientific rules, in the same manner as perspective. The scene painter, in the first place, should be thoroughly conversant with the laws of colours, as it is only by that means that he can judge accurately of the appearance the colours he paints by day will have when subjected to an intense artificial light at night. In the next place, it is indispensable that he be well versed in the rules of both linear and aërial perspective. He traces, by fixed geometrical operations, lines bended or inclined, which the spectator, placed at the proper point of view, imagines to be straight ones. He employs gradual diminutions of plans which present the appearance of an extent and distance, existing merely in his own art; thus in a few fathoms to which he is bounded, expressing an extent sometimes almost infinite. He uses chiefly water-colours, on account of their operating promptly and presenting no glossy surface.

There are two descriptions of light to be paid attention to in scene painting. One the light which the painter supposes to illuminate the object of his performance; the other that which actually does light up the canvas; and in this respect the scene painter possesses a great advantage over every other, in multiplying, combining, and contrasting to his taste, and the number and force of the hidden lights with which he radiates his work.

But, on the other hand, the scene painter has to contend with difficulties peculiar to his confined walk of art. The necessity of giving a brilliant light to the audience part of the house is often destructive to the truth and delicacy of those tints which the artist applies to his scene; while, in addition, the perspective is frequently contradicted and violated by the actor moving about at the very back of the stage; when all those objects placed there, which, whilst the performer remained in front—where everything is in unison with his natural size—appeared in due proportion, lose their verisimilitude, and appear insignificant and disproportioned. The man becomes of the same height as the rock or tree, and the imagination of the spectator has insufficient power to preserve the illusion of the scene. The latter disadvantage, which can scarcely be obviated, the artist would do well, nevertheless, to keep constantly in remembrance, and to modify as much as possible—and the actor, also, if he be desirous of rendering the representation a perfect one, will remain as little as possible at the back of the scene.

As the scene painter is often required to decorate the places represented with statues, &c., it is necessary that he should be capable of drawing well the human figure; he should also possess a knowledge of, and a taste for, the *chefs-d'œuvre* of ancient art; and should be especially careful not to violate consistency by placing for instance, in a Grecian temple, affected or mutilated statues. In addition to these qualifications, architectural and landscape painting should enter into his course of study, as their use, and, indeed, necessity, must be self-evident.

To the scene painter, the use of brilliant colours, of skilful *chiaro-scuro*, of striking management of masses of light and shade, is obvious. He addresses less the heart and understanding than the eye. With him *effect* is everything. His fame, as well as his works, is commonly of short duration; and there is, consequently, the greater reason that he should acquire that promptness and decision of style which would secure immediate approbation.

For a performance of this description to be eminently successful, it is requisite that it should be not only well painted and striking in effect, but that it should be also *appropriate*—in good *costume;* it should conform, in style and in taste, to the manners and usages of the people amongst whom the scene is placed.

Technicologia.

220. *To make Compo Ornaments for Picture Frames, &c.*—Boil seven pounds of the best glue in seven half-pints of water; melt three pounds of white resin in three pints of raw linseed oil. When the ingredients are well boiled, put them into a large vessel and simmer them for half-an-hour, stirring it, and taking care it does not boil over. When this is done, pour the mixture into a large quantity of whiting (previously rolled and sifted very fine), and mix it to the consistence of dough, and it is ready for use.

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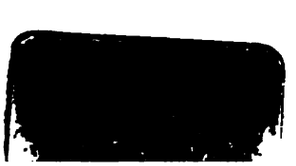
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